

Peer Review Demystified

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Peer review is what makes an EPSRC grant so valuable. If you are awarded an EPSRC grant then you, and your head of department, both know that you deserve it. Your proposal was scrutinised by a number of anonymous experts in the field who are trying to get money from the same pot. Then at a Panel Meeting, your ideas managed to float pretty close to the top of a very large pile. Finally it managed to avoid the Programme Manager's financial razor.

This article is a personal view of this all-important process of Peer Review. It is designed to introduce those who are new to the game to how it works. Hopefully it will also be of some interest to a more experienced audience. It describes the life cycle of a proposal, from final draft to funding. Or otherwise.

Before you submit

We like to think that the best science and engineering gets the money, and it's true that the best way of influencing the funding outcome for your proposal is to make it technically outstanding, timely (or fashionable) and good value. But you can also do yourself some favours. Take a look at the referees' form and associated guidelines; these are downloadable from the Research Zone of the EPSRC website. Referees are busy people, and you should consider helping them along by giving them something to put into the various sections (if you can't think of what to write in the *Adventure in Research* section, what chance do they have?). In my experience, referees really do want to say positive things, and they know that if they are not fair with a proposal, they will be found out at the Panel Meeting (*vide infra*).

Pitching the level of resources (*i.e.* money) you request is important and difficult. In my first application (just before the days of Fast Stream) I asked for a post-doc, but the panel thought (wrongly) that a student could do the job so awarded me that. *This does not happen any more*. If your proposal is judged to be poor value for money you will most likely just get nothing. Having said that, don't be afraid of asking for big money for expensive research. Look at your proposed outcomes and ask yourself if they justify the costs. Compare your costs with those of similar grants that have already been awarded. Make sure that you explicitly justify all the requested resources.

You also get to nominate three potential Referees of which at least one is used. This is another big chance to influence Peer Review, but tread carefully. It might seem an obvious choice for younger investigators to nominate their former supervisor, but I have seen this and similar strategies backfire in a number of ways; a mediocre review from your boss would probably kill the proposal, and a too-good-to-be-true review would probably be regarded by the Panel as too good to be true. Sometimes the proposal is sent back by former colleagues and supervisors because of a "conflict of interest". While I don't propose that you choose arch rivals and known felons, I do think it's worth suggesting credible, major players in your field. These people want to be seen as being fair, and if they write you a good review their influence will push you up the list. How about nominating people in *related* fields who will understand and appreciate your work? This may well help in these days of cross/multidisciplinarity. I work on the principle that if I suggest three well-known reviewers who have little to gain or lose from supporting me, and that come from three related sub-disciplines, then the people in the EPSRC office might just pick more than one of them.

In the Office

Assuming that you have sent all the bits and filled in the form properly, the EPSRC office will start to send out your proposal to Referees. At least one of these Referees will be from your list, and the rest will usually be members of the Peer Review College (*vide infra*). The office will need at least three reviews before they can let the proposal go on to the next stage, and since not everyone sends back a review they tend to send it to more than three.

For you at this stage, it's just a matter of waiting. The process can, and does, take months. Make use of the Grant Progress Check facility on the EPSRC website. Mostly, it will say "Proposal is being refereed". In the meantime, work on your forthcoming membership of the Peer Review College.

Peer Review College

EPSRC has just been through the process once more of gathering nominations for membership of the next Peer Review College; a diverse group of experts in the various fields of Engineering and Physical Sciences. The full list of the current College is published on the EPSRC website and elsewhere. If a name appears there it was suggested by at least one, and probably several people, on the EPSRC mailing list (*e.g.* current College Members, people who have sent proposals to EPSRC, industrial supervisors of CASE awards, *etc.*). The office also tries to make sure that College has sufficient expertise in all areas and is balanced in terms of gender and age. There's not much you can do directly about getting onto the College, but if you publish papers, give research lectures, write decent reviews of proposals and make friends, then College Membership will come.

Big White Envelope time

Eventually, the referees will have done their job. You will receive copies of their comments, together with an invitation to write a one page response for the Panel on (i) questions raised by the referees and (ii) any factual inaccuracies in their reports. It's an emotional time, but my advice is to keep your head. If you write "one page" in single-spaced 7 point Times, you will annoy most Panel members. If you restate the positive comments made by the Reviewers, you will bore the Panel (they can read the review for themselves, thanks). If you lash out at that negative review you will only draw more attention to it. Don't underestimate the Panel. Make a calm, reasoned and *short* case if the Referee has got something wrong. Respond to questions with a tone you might use at a research seminar.

Then I usually sleep on it, take out the sarcasm, paperclip a couple of fivers to it, and send it off in good time for the Panel Meeting.

The Prioritisation Panel

Panel Meetings for the Responsive Mode take place between three and eight times a year at Polaris House, Swindon. They usually last for one day but there are exceptions. All of the panel members will be taken from the Peer Review College, which includes both academics and industrialists. There will be senior professors, quite young lecturers and others in-between. The Chair of the Panel has usually also attended the previous meeting in an attempt to achieve consistency between panels. Typically around 30% of the panel will also have attended a recent Panel for the same reason.

Once upon a time, there were separate "sub-discipline" panels. In my field these were called things like "Inorganic Synthesis", "Organic Synthesis" and "Structure, Bonding and Reaction Mechanisms". Now we just have "Chemistry". It's beyond the scope of this article to go into the pros and cons of this mammoth change. Ask one of your senior colleagues. They are sure to have an opinion.

Weighing up the evidence

After the usual niceties, the proposals are considered one-by-one. Your proposal will have been allocated to two Panel Members. Usually only one will be an expert in your general field, the other will be a so-called non-expert. This is not as odd as it sounds; the speaker's job is to draw on the Referees' comments and your responses and not to be a Referee themselves. Having said that, re-refereeing naturally does happen but a good Chair will keep this under strict control. More often than not, the referees will have in some way disagreed with one-another, and the Speaker will try to give one review more "weight" than another, rather than simply averaging a good and a bad review to give a mediocre one. The second speaker is supposed to comment on any differences of opinion they have with the first speaker, but it usually gets more detailed than that. It is at this point that the other Panel Members can have their say. Generally this tends to be the ones that you might regard as the other "experts" in the room since these are the ones that are most likely to have read your proposal in any detail.

The main criterion for assessment is Scientific Quality. Secondary issues include the ability of the PI or team to undertake the research (*i.e.* Track Record), viability and planning, relevance to beneficiaries (be they academic or commercial) and cost-effectiveness. For example, if you did not fully justify all your costings, this is where you could lose marks out of ten.

Marks out of ten

After all the work you put into getting preliminary results, and writing and re-writing the proposal, the Panel agree on a score for it out of 10. In my view, the Grading Scale that the EPSRC has agreed on is pretty useless. Anything from five to nine is defined as "Good". Bizarrely also, three and four out of ten are defined as "Adequate", but to be honest, 4/10 really means "Adequate for Rejection". Here is my own (only slightly tongue-in-cheek) table of definitions that may get used at Chemistry Prioritisation Panels (I couldn't possibly comment). The scores are really just there to help the Panel to rank the proposals, and you don't get to know your score.

Grade	EPSRC definition	Paul Scott's Definition
10	Outstanding	Despite my best efforts I can't fault this. It really must be funded. If necessary I will sell my house.
9.5	Good	OK, one jealous referee was slightly aggressive, but we all loved it. If it's not funded I will write to the Queen.
9		Really great stuff, but maybe a little expensive. If it is not funded I will complain fruitlessly about how awful things are to all my colleagues back home.*
8.5		Maybe if we had talked about this one yesterday we would have given it a 9.
8		There's clear water between this and the 9.5's . We didn't get so excited about it. I hear that the programme manager has not got enough money to fund it anyway.
7.5		We scored this one before we got to hear the rumour about how few of the proposals were going to be funded. It's good science.
6		The referee's reports were just not good enough.
5		
4	Adequate	
3		
2	Unsatisfactory	
1		

* I will do this anyway.

If your proposal got consistently poor or mediocre reviews, the Panel is not likely to spend much time on it. Some of them will have looked at it beforehand and will be happy that the referees were being fair. On the panel that I chaired I decided to spend time on getting feedback for the proposers rather than arguing whether it should have a five or a six out of ten.

Comparing apples & oranges

The Panel must then rank the proposals in order, starting from the best and working downwards. This is the most frustrating and difficult part of the process. In the old days with the specialist panels it was much easier, since all the proposals were in a similar area, but with the new Single Panels it is tough if not impossible. How does one compare a proposal on the development of a new catalyst with another on the study of the gas phase spectroscopy of Ar₂? What I can say is that there is usually quite good agreement across the panel, and most Panel members rise to the occasion perhaps wishing to appear fair and equitable to their colleagues in related disciplines. In my field, the organic chemists might be talking up a spectroscopy proposal because the investigator is young and did not ask for outrageous sums of money. The chemical physicists will be promoting an inorganic synthesis project because it was really adventurous. The inorganic chemists have got a good idea of how good the organic ones are in comparison.

I have heard people say that it's all a bit of a lottery, and I suppose that there *is* some luck involved, *e.g.* in getting the right Referees. But in all panels I have attended the proposals with the best Referee's reports and in my view the *best science* got funded. What makes me sad is the long list of excellent stuff that missed the cut. Especially when one of mine is in there.

The Cut

Over the next few days after the Panel Meeting, the Programme Manager takes the ranked list of proposals and associated costs. He/she will look at what's left in his/her budget for the year and draw the line accordingly. Proposals above the line get funded. A few that just miss the cut may be considered again at the next panel, often appearing again at about the same position. At the end of the process, most people are unhappy. The Panel expected to be able to fund more proposals than there was money available. Most (maybe 80%) of the proposers do not get funding. The EPSRC officers have to field the complaints. The system needs more money.

The Aftermath

If your proposal was funded then, as I said before, you deserve it. No question. If it is being referred to a subsequent panel, then best of luck to you. If you are in the unhappy majority, then you will have been told that you must wait for six months before resubmission to enable you to reflect whether it really is worth taking any further before re-writing - how about bouncing it off your best friend to get an honest answer? If you just resubmit the same thing it's likely to get a similar ranking, so my advice is to look at any feedback from the Panel, sit down with those referee's comments again, and write a better proposal.