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Conservation scientist Aerin Jacob (right) conducts field work with a colleague in British Columbia, Canada, in 2018.

SECRETS TO WRITING A WINNING GRANT

Experienced scientists reveal how to avoid application pitfalls to submit successful proposals. **By Emily Sohn**

When Kylie Ball begins a grant-writing workshop, she often alludes to the funding successes and failures that she has experienced in her career. “I say, ‘I’ve attracted more than \$25 million in grant funding and have had more than 60 competitive grants funded. But I’ve also had probably twice as many rejected.’ A lot of early-career researchers often find those rejections really tough to take. But I actually think you learn so much from the rejected grants.”

Grant writing is a job requirement for research scientists who need to fund projects year after year. Most proposals end in rejection,

but missteps give researchers a chance to learn how to find other opportunities, write better proposals and navigate the system. Taking time to learn from the setbacks and successes of others can help to increase the chances of securing funds, says Ball, who runs workshops alongside her role as a behavioural scientist at Deakin University in Melbourne, Australia.

Do your research

Competition for grants has never been more intense. The European Commission’s Horizon 2020 programme is the European Union’s largest-ever research and innovation programme, with nearly €80 billion

(US\$89 billion) in funding set aside between 2014 and 2020. It reported a 14% success rate for its first 100 calls for proposals, although submissions to some categories had lower success rates. The commission has published its proposal for Horizon Europe, the €100-billion programme that will succeed Horizon 2020. In Australia, since 2017, the National Health and Medical Research Council has been funding less than 20% of proposals it receives. And the US National Science Foundation (NSF) received 49,415 proposals and funded 11,447 of them in 2017 – less than 25%. That’s tens of thousands of rejections in a single year from the NSF alone.

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Being a renowned scientist doesn't ensure success. On the same day that molecular biologist Carol Greider won a Nobel prize in 2009, she learnt that her recently submitted grant proposal had been rejected. "Even on the day when you win the Nobel prize," she said in a 2017 graduation speech at Cold Spring Harbor Laboratory in New York, "sceptics may question whether you really know what you're doing."

To increase the likelihood of funding success, scientists suggest doing an extensive search of available grants and noting differences in the types of project financed by various funding bodies. Government agencies such as the NSF tend to be interested in basic science that addresses big, conceptual questions, says Leslie Rissler, programme director at the NSF's Division of Environmental Biology in Alexandria, Virginia. A private foundation, however, might prioritize projects that inform social change or that have practical implications that fit into one of its specific missions.

Pitching a proposal

Before beginning an application, you should read descriptions and directions carefully, advises Ball, who recently pored over 200 pages of online material before starting a proposal. That effort can save time in the end, helping researchers to work out which awards are a good fit and which aren't. "If you're not absolutely spot on with what they're looking for, it may not be worth your time in writing that grant," she says.

Experienced scientists suggest studying successful proposals, which can often be acquired from trusted colleagues and supervisors, university libraries or online databases. A website called Open Grants, for example, includes more than 200 grants, both successful and unsuccessful, that are free to peruse.

Grant writers shouldn't fear e-mailing or calling a grants agency to talk through their potential interest in a project, advises Amanda Stanley, executive director at COMPASS, a non-profit organization based in Portland, Oregon, that supports environmental scientists. For six years, she worked as a programme officer for the Wilburforce Foundation in Seattle, Washington, which supports conservation science. At this and other private foundations, the application process often begins with a 'soft pitch' that presents a brief case for the project. Those pitches should cover several main points, Stanley says: "Here's what I'm trying to do. Here's why it's important. Here's a little bit about me and the people I'm collaborating with. Would you like to talk further?" She notes that a successful proposal must closely align with a foundation's strategic goals.

Each organization has its own process, but next steps typically include a phone conversation, a written summary and, finally, an invitation to submit a formal application.

"Once you've gotten that invitation to submit a proposal from the programme officer, your chances of getting funded are really, really high," Stanley says.

The write stuff

Applicants should put themselves in the shoes of grant reviewers, who might need to read dozens of applications about complicated subjects that lie outside their own fields of expertise, often while juggling their own research.

"Imagine you're tired, grumpy and hungry. You've got 50 applications to get through," says Cheryl Smythe, international grants manager at the Babraham Institute, a life-sciences research institution in Cambridge, UK. "Think about how you as an applicant can make it as easy as possible for them."

Formatting is an important consideration, says Aerin Jacob, a conservation scientist at the Yellowstone to Yukon Conservation Initiative in Canmore, Canada. White space and bold headings can make proposals easier to read, as can illustrations. "Students are tempted and sometimes encouraged to squeeze in as much information as possible, so there are all kinds of tricks to fiddle with the margin size, or to make the font a little bit smaller so that you can squeeze in that one last sentence," Jacob says. "For a reviewer, that's exhausting to read."

Ball advises avoiding basic deal-breakers, such as spelling errors, grammatical slips and lengthy proposals that exceed word limits. Those kinds of mistake can cast doubt on how rigorous applicants will be in their research, she says. A list of key words, crucial for indexes and search engines, should be more than an afterthought, Ball adds. On a proposal for a project

on promoting physical activity among women, she tagged her proposal with the word 'women'. The descriptor was too broad, and her application ended up with a reviewer whose expertise appeared to be in sociology and gender studies instead of in exercise or nutrition. The grant didn't score well in that round of review.

To prevent a reviewer's eyes from glazing over, Jacob says, use clear language instead of multisyllabic jargon. When technical details are necessary, follow up a complex sentence with one that sums up the big picture. Thinking back to her early proposals, Jacob remembers cramming in words instead of getting to the point. "It was probably something like, 'I propose to study the heterogeneity of forest landscapes in spatial and temporal recovery after multiple disturbances,' rather than, 'I want to see what happens when a forest has been logged, burnt and farmed, and grows back,'" she says.

Grants can be more speculative and more self-promotional than papers are, Rissler adds. "A grant is about convincing a jury that your ideas are worthy and exciting," she says. "You can make some pretty sweeping generalizations about what your proposed ideas might do for science and society in the long run. A paper is much more rigid in terms of what you can say and in what you must say."

Getting some science communication training can be a worthwhile strategy for strengthening grant-writing skills, Stanley says. When she was reviewing pitch letters for a private foundation, she recalls that lots of scientists couldn't fully explain why their work mattered. But when she received pitches that were clear and compelling, she was more willing to help those scientists brainstorm other



Grants manager Cheryl Smythe (left) allows for IT glitches when submitting grant proposals.

LOUISA WOOD

possible funding agencies if her foundation wasn't the right fit. Scientists who sent strong – albeit unsuccessful – applications were also more likely to get funding from the foundation for later projects.

Science storytelling

To refine project pitches and proposals, Stanley recommends that scientists use a free communication tool from COMPASS called the Message Box Workbook, which can help to identify key points and answer the crucial question for every audience: 'So what?' Scientific conferences often provide symposia or sessions that include funders and offer helpful tips for writing grants. And development officers at institutions can help scientists to connect with funders. "A good development officer is worth their weight in gold," Stanley says. "Make friends with them."

Jacob has taken science-communication training through COMPASS, The Story Collider (a science-storytelling organization) and from other such organizations. She has learnt how to talk about her work in the manner of a storyteller. In proposals and interviews, she now includes personal details, when relevant, that explain the problems she wants to address and why she decided to speak out about conservation – an example of the kind of conflict and resolution that builds a good story. Jacob senses that the approach strikes a chord. "As a reviewer, you remember somebody's proposal just that little bit more," she says. "If you have a stack of proposals, you want to find the one that you connect with."

A clear focus can help to boost a grant to the top of a reviewer's pile, Ball adds. In one of the first large grants that she applied for, she proposed collecting information on the key factors that prevent weight gain as well as designing and implementing an obesity-intervention programme. In retrospect, it was too much within the grant's two-year time frame. She didn't get the funding, and the feedback she received was that it would have worked better as two separate proposals. "While it's tempting to want to claim that you can solve these enormous, challenging and complex problems in a single project," Ball says, "realistically, that's usually not the case."

Teaming up with collaborators can also increase the chance of success. Earlier this year, Ball was funded by the Diabetes Australia Research Program for a study that she proposed in collaboration with hospital clinicians, helping disadvantaged people with type 2 diabetes to eat healthy diets. Earlier in her career, she had written grants based on her own ideas, rather than on suggestions from clinicians or other non-academic partners. This time, she says, she focused on a real-world need rather than on her own ideas for a study. Instead of overreaching, she kept the study small and preliminary, allowing her to test the approach before trying to get

funding for larger trials.

It is acceptable – even advisable – to admit a study's limitations instead of trying to meet preconceived expectations, Jacob adds. In 2016, she had a proposal rejected for a study on spatial planning on the west coast of Canada that would, crucially, be informed by knowledge from Indigenous communities. She resubmitted the same proposal the next year to the same reviewers, but with a more confident and transparent approach: she was straightforward about her desire to take a different tack from the type of research that had been tried before. This time, she made it clear that she

"Grant writers shouldn't fear e-mailing or calling a grants agency."

wanted to listen to Indigenous peoples and use their priorities to guide her work. She got the funding. "I saw that if I tried to change it to meet what I thought funders wanted, I might not be accurately representing what I was doing," she says. "I just wanted to be really clear with myself and really clear with the interviewers that this is who I am, and this is what I want to do."

What not to do

Writing is hard, and experienced grant writers recommend devoting plenty of time to the task. Smythe recommends setting aside a week for each page of a proposal, noting that some applications require only a few pages while major collaborative proposals for multi-year projects can run to more than 100 pages. "It can take months to get one of these together," she says.

Scheduling should include time for rewrites, proofreads and secondary reads by friends, colleagues and family members, experts say. Working right up to the deadline can undo weeks to months of hard work. At the last minute, Jacob once accidentally submitted an earlier draft instead of the final version. It included sections that were bolded and highlighted, with comments such as, "NOTE TO SELF: MAKE THIS PART SOUND BETTER." She didn't get that one, and has never made the same mistake again.

Add an extra buffer for technology malfunctions, adds Smythe, who once got a call from a scientist at another organization who was in a panic because his computer had stopped working while he was trying to submit a grant proposal half an hour before the deadline. She submitted it for him with 23 seconds to spare. "My hand was shaking," she says. That proposal was not successful, although the scientist sent her a nice bottle of champagne afterwards.

Grant writing doesn't necessarily end with a proposal's submission. Applicants might receive requests for rewrites or more information. Rejections can also come with feedback,

and if they don't, applicants can request it.

Luiz Nunes de Oliveira, a physicist at the University of São Paulo, Brazil, also works as a programme coordinator at the São Paulo Research Foundation. In this role, he sometimes meets with applicants who want to follow up on rejected proposals. "We sit down and go through their résumé, and then you find out that they had lots of interesting stuff to say about themselves and they missed the opportunity," he says. "All it takes is to write an e-mail message asking [the funder] for an interview."

Jacob recommends paying attention to such feedback to strengthen future proposals. To fund her master's programme, she applied for a grant from the Natural Sciences and Engineering Research Council of Canada (NSERC), but didn't get it on her first try. After requesting feedback by e-mail (to an address she found buried on NSERC's website), she was able to see her scores by category, which revealed that a few bad grades early in her undergraduate programme were her limiting factor.

There was nothing she could do about her past, but the information pushed her to work harder on other parts of her application. After gaining more research and field experience, co-authoring a paper and establishing relationships with senior colleagues who would vouch for her as referees, she finally secured funding from NSERC on her third try, two years after her first rejection.

Negative feedback can be one of the best learning experiences, Rissler adds. She kept the worst review she ever received, a scathing response to a grant proposal she submitted to the NSF in 2003, when she was a postdoc studying comparative phylogeography. The feedback, she says, was painful to read. It included comments that her application was incomprehensible and filled with platitudes.

After she received that letter, which is now crinkled up in her desk for posterity, Rissler called a programme officer to ask why they let her see such a negative review. She was told that the critical commenter was an outlier and that the panel had gone on to recommend her project for the grant, which she ultimately received. "I learnt that you do need to be tough," says Rissler, who now helps to make final decisions on funding for other scientists. She emphasizes that whereas reviewers' opinions can vary, all proposals undergo multiple independent expert reviews, followed by panel discussions and additional oversight by programme directors.

Grant writing tends to provoke anxiety among early-career scientists, but opportunities exist for people who are willing to take the time to develop ideas and push past rejections and negative feedback, she says. "We can't review proposals that we don't get."

Emily Sohn is a freelance journalist in Minneapolis, Minnesota.