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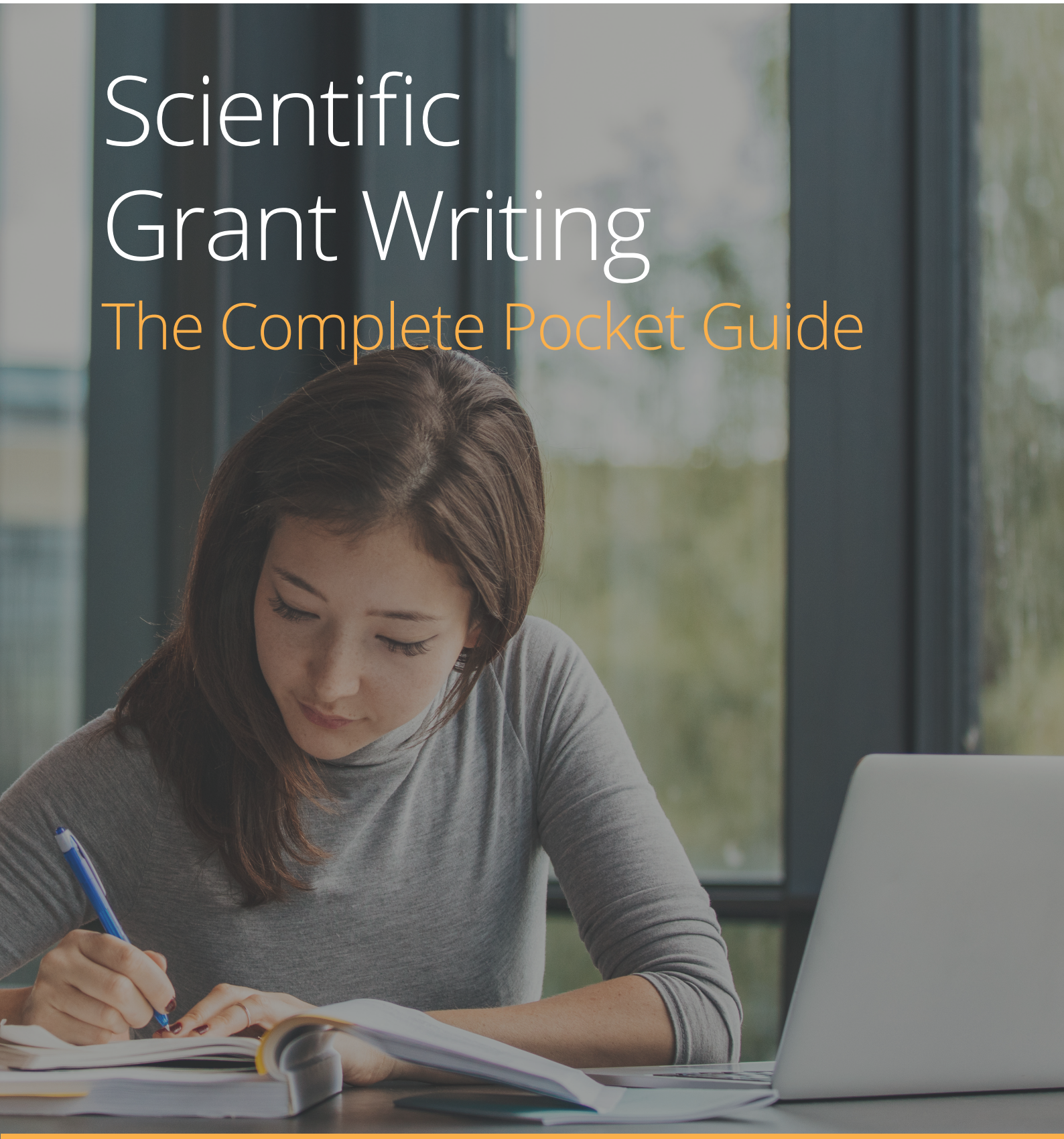
Scientific Grant Writing

The Complete Pocket Guide



iMotions – Biometric Research, Simplified

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BIOMETRIC RESEARCH PLATFORM

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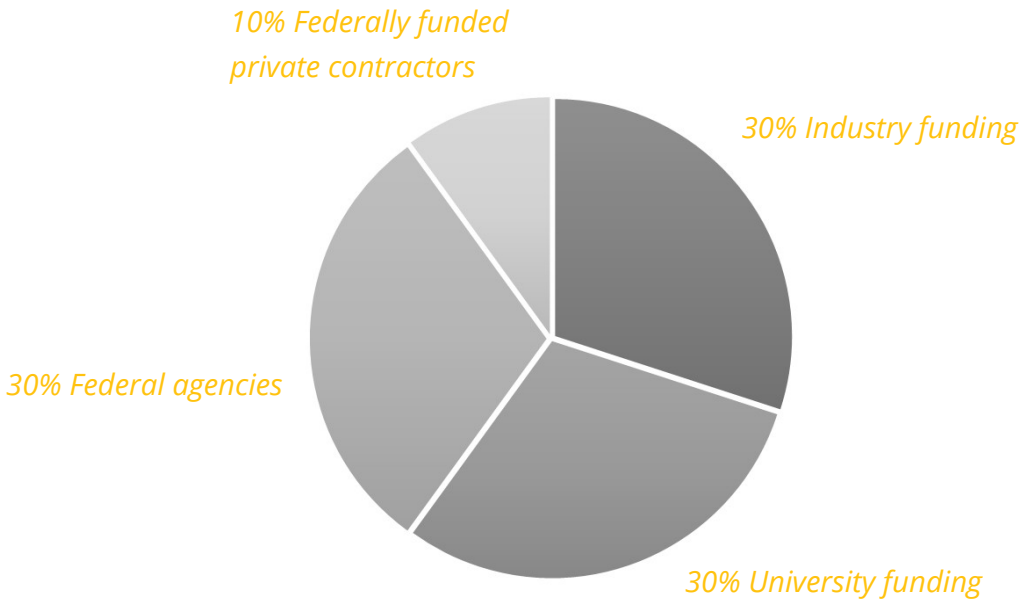
Scientific Grant Writing

Why do researchers have to write grant applications?

In a perfect world, researchers have an unlimited amount of money to run their studies, purchase top-notch soft- and hardware, pay respondents, participate in conferences, and publish their results in high-impact journals.

The reality is something else. In the wake of significant budget cuts within the recent years in a volatile economic climate, monetary resources of societies for research and development (R&D) are not indefinite, requiring a competitive selection procedure for scientific research projects. In 2014, the United States spent a total of $432 billion on R&D projects (about 2.74% of their global domestic income), with research being funded primarily by government grants, companies, and non-profit foundations.

According to the National Science Foundation (NSF), federal R&D money is distributed in the following way:



Each day, you support each of those R&D sectors indirectly through the taxes you pay, products and services you purchase from companies, and donations you make to charities. Something as simple as buying an aspirin may help foot the bill for research on Parkinson's disease.

Paying the bill, society expects all funded research projects to live up to the highest scientific standards. Governmental and nongovernmental agencies, companies, and foundations spend a significant amount of time and resources screening the academic landscape for exactly those projects that are aligned with their standards, philosophy, and vision.

Particularly projects with excellent merit and high probability to produce results in due time will be the ones that receive funding. By contrast, other funding sources exist that specifically kick-start more "risky" research projects, where outcomes are not guaranteed but the potential gain for society could be tremendous.

How winning a grant can affect your scientific career

Jacobs & Lefgren (2000) analyzed the impact of grants awarded by the National Institutes of Health (NIH) on the careers of grant recipients, and showed the following striking effects:

>> Winning a postdoctoral research grant increases your chances for publishing within the next five years by 20%.

>> Winning a postdoctoral grant increases your chances to publish one paper by 11% and five papers by 23%.

>> Winning a first-time grant will produce one or more additional publications within the next five years.

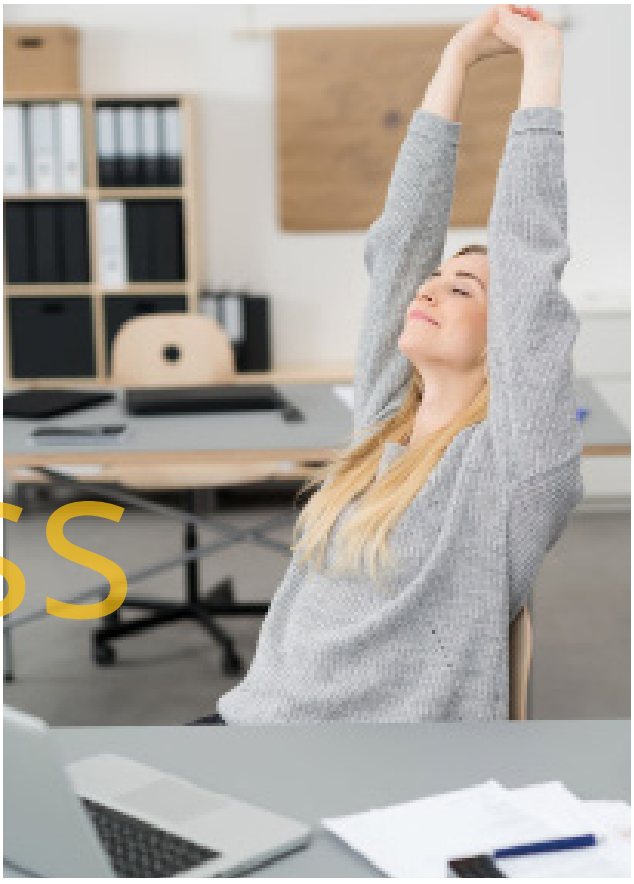
>> Winning any NIH grant will on average get you $252,000 more in NIH funding for the following six to ten years.

Only the best-in-class projects are funded - this is why winning grants is fundamental for you and your team. Only funding makes your projects possible, enables you to purchase soft- and hardware, run studies and simulations, pay your respondents, attend conferences and visit other labs, and publish your results in peer-reviewed journals. And of course, winning grants and running a successful lab makes your unit attractive for Undergraduate and Graduate Students, Postdocs and potential collaborators from neighboring units of your own or even other research institutions. Besides the direct benefits of having the required monetary resources to get your research done, writing successful applications also has quite beneficial “side effects” on your academic career.

Winning grants is prestigious. It is also hard work. Failure is omnipresent, and good coping strategies and your ability to deal with failure is certainly necessary to keep going and move on. Good news is that, unlike research paper submissions which have to be unique, grant applications allow you to work with templates and re-purposed text, allowing you to focus the most important parts of a proposal: Your research idea and its packaging.

In this pocket guide you will find the most important aspects when it comes to grant writing, best practices for content and style.

Let’s make sure that your next proposal is a success.



success

>> Make writing grant applications a smooth experience!

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What's inside?

THE BASICS ... and BEYOND

PLAN YOUR PROPOSAL

WHAT TO WRITE: PROPOSAL ELEMENTS

HOW TO WRITE: STYLE AND LAYOUT

OUTLOOK

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THE BASICS

What is a grant?

Put simply, grants are non-repayable funds handed out by the government, corporations or foundations to a recipient. In order to receive a grant, some form of grant writing – often referred to as *proposal* or *application* – is required.

You can either submit proposals to a potential funder on your own initiative, or respond to a call for proposal from the funder. Most grants fund a specific project or equipment and require a certain level of compliance and reporting.

Generally, proposal requirements vary depending upon

>> the funding source

>> the grant category

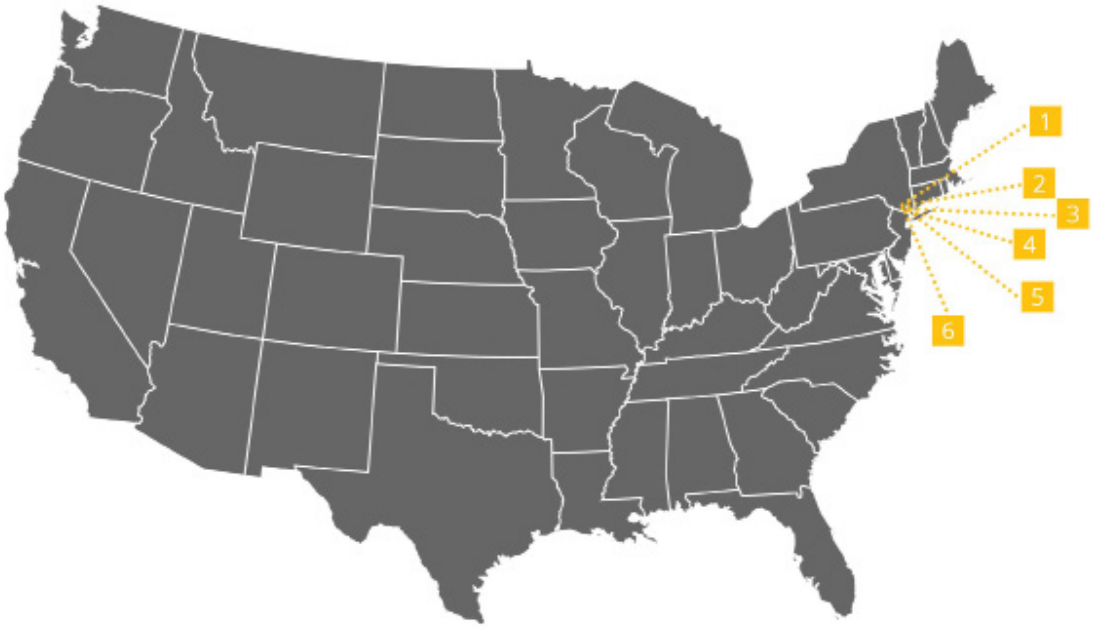
We will take a closer look at the different forms of funding and types of grants in the following sections.

inform

>> *Stay in the loop and educate yourself about the specific application requirements.*

Funding sources

Most national funding agencies in the US are located on the East Coast:



Government funding

Major government funding sources in USA include:

1

National Science Foundation (NSF)

NSF is an independent federal agency and supports fundamental research and education in all the non-medical fields of science and engineering. Typically, NSF grants go to individuals or small groups of investigators who carry out research at their home campuses. Some grants further provide funding for mid-scale research centers, instruments, and facilities that serve researchers from many institutions. Still, others fund national-scale facilities that are shared by the research community as a whole.

2

National Institutes of Health (NIH)

Being an agency of the United States Department of Health and Human Services, NIH is the largest funder of biomedical research in the world, and the primary agency of the United States government responsible for health-related projects. Additionally to research conducted on-site, NIH provides funding for extramural projects all across the US. A study of Jacobs & Lefgren (2000) shows how winning an NIH grant positively affects your research productivity.

Funding through US military

The US military primarily funds research projects through the following agencies:

3

Defense Advanced Research Projects Agency (DARPA)

DARPA is an agency of the U.S. Department of Defense responsible for the development of emerging technologies for use by the military. DARPA pursues strategic funding of innovative research proposals.

4

Office of Naval Research (ONR)

ONR sponsors research in core basic and applied research in new, high-risk areas investigated by multidisciplinary and multi-departmental teams. It funds topics that foster leading-edge science and attract new principal investigators and organizations.

Private grants

Private grants are given by a foundation, corporation or nongovernmental agency. Since private institutions are not buried under as much bureaucracy and red tape as the federal government, private grants can be easier to get as compared to federal grants. Examples in the human behavior research fields are:

5

The Swartz Foundation

The strategic intent of the Swartz Foundation is to integrate problem-solving approaches from physics, mathematics, electrical engineering, and computer science into neuroscience research to better understand the relationship between the human brain and mind.

6

The Alfred P. Sloan Foundation

The Alfred P. Sloan Foundation makes grants year-round to support original research and broad-based education related to science, technology, and economic performance.

Grant categories

It is important to understand what can and what can't be funded on a particular call for proposals. Basically, there are several different grant categories that differ in their funding objectives and their scope of funding.

Get familiar with:

1

Research Grants

are mostly used to support discrete, specified, circumscribed research projects, typically lasting up to five years. This is NIH's most commonly used grant program, supporting the research of teams of scientists from one or more universities. Grant funds must contribute to the direct costs of the research for which the funds were awarded, and the benefits should be directly attributable to the grant.

INSIDE SCOOP

NIH Grants

The NIH R03 "Small Grant" category supports small research projects that can be carried out in a short period of time with limited resources. It provides funding for up to two years and up to $50,000. This category is an excellent starting point for your next pilot study, secondary data analysis or projects aiming at the development of innovative research methodology/technology as no preliminary data is required (but may be included if available).

The NIH R21 "Exploratory/Developmental Research" category provides support for early and conceptual project stages. Project funding of up to $275,000 is available for up to two years. Particularly research proposals with a focus on exploratory studies breaking new ground or extending previous discoveries are fostered. At the same time, high-risk/high-reward studies are funded that may lead to a breakthrough in a particular area or result in novel techniques, agents, methodologies, models or applications that will impact biomedical, behavioral or clinical research.

2

Resource/Equipment Grants

typically provide funding for specific devices and instruments (such as biosensors and biomedical imaging devices like EEG, eye tracking or fNIRS systems) including software that is too expensive to be obtained through a research project grant. The purchase is typically not bound to one single project, but can be shared among several groups or scientific programs. Often, these grants cover the direct costs of the instruments, while the host institution must meet costs for maintenance, service contracts, and technical support. An example for an equipment grant is NIH's Shared Instrumentation Grant Program.

3

Career Development Grants

are excellent ways to fund your project at any career stage. Particularly early-stage investigators (such as PhD students or postdocs) can gain significant momentum with funding for an intensive, supervised career development experience in the biomedical, behavioral or clinical sciences leading to research independence. Funding is provided to junior faculty members who exemplify the role of teacher-scholars through outstanding research, excellent education, and the integration of education and research within the context of the mission of their organizations. Such activities should build a firm foundation for a lifetime of leadership in integrating education and research. Examples for this type of grant are the NSF Faculty Early Career Development Program, or NIH's various Research Career Development Awards (such as K01, or K99 "Pathway to Independence" Award).

4

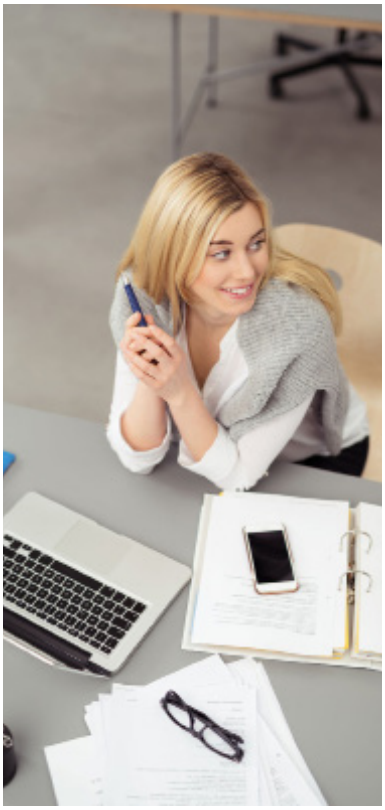
Education Grants

target at supporting low-income academically talented students who are pursuing associate, baccalaureate or graduate degrees. With this grant type, the education of future scientists, engineers, and technicians is supposed to be secured by curricular and co-curricular activities affecting students' academic advancement. For a representative example, visit NSF's Undergraduate Education Program.

5

Travel Grants

provide funding for student and re-/postgraduate researchers in order to attend scientific congresses and conferences or to visit internationally recognized research institutions to collect data and meet experts to discuss preliminary results. While not that common for government funding sources, private foundations typically provide a wide variety of travel grant opportunities.



Grants vs. fellowships

>> In general, grants and fellowships do not need to be repaid. While oftentimes the terms are used interchangeably, there is one major distinction you should be aware of:

Grants are tpyically paid to your research institution which then distributes the money to you and your team.

Fellowships usually refer to funding in support of single researchers (most likely PhD students or postdocs). In this case, the money is directly paid to the awardee and is provided for a limited period of time (comparable to a contract).

The grant lifecycle

Independent of the funding source and grant category you apply for, a typical grant lifecycle comprises several common elements (or stages).

On your part it will include thorough planning, the writing of the proposal, and the submission of your grant application (along with some jittering whether your project will be funded).

To help you gain a competitive edge and prepare the best way possible, we will get to each of them in the following sections.

Prepare your proposal

(6-12 months)

>> Find the right program for you and your idea
>> Become a "student" of the RFA
>> Develop a timeline for proposal preparation
>> Understand criteria used to evaluate proposals
>> Understand the review process and reviewers

Write your proposal

(1-3 months)

>> Write the proposal clearly and logically
>> Prepare budget with a strong justification
>> Obtain critical input from experienced colleagues

Submit your proposal and await award notification

(up to 10 months)

>> Track application and await funding decision
>> Start your project and report results

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PLAN YOUR PROPOSAL

Plan your proposal

Putting together your proposal can easily take 12 months (or even longer), so planning ahead is certainly key. Keep a keen eye on the horizon, steering safely but steadily towards accomplishing all necessary requirements of the application.

Frankly, there is nothing more stressful than realizing that you are preparing for a funding scheme that doesn't really support the idea of your project, or noticing that you have left out core aspects in your research question and missed to contact relevant stakeholders.

1

Phrase your idea

Excellent research starts with an innovative and transformative idea. The best research questions are breaking new ground – they address something that has not been answered before and siginficantly contribute to science. You want to push beyond the limits of the known, and this requires your ideas to be anchored in the framework of existing theories and hypotheses. Allow your idea to reference the existing state of knowledge – pick up the threads that were dropped by already existing studies in the field. Be sure you are up-to-date on techniques and technology, literature, and interpretations of ideas or theories (Kraicer, 2015).

Checklist: Shape your idea

>> Hypothesis:
Is the hypothesis clear, concise, and testable?

>> Focus on aims:
Are outcomes and implications clear?

>> Questions:
Are there questions that need to be addressed?

>> Experimental Design:
Can you specify and design experiments that will allow you to test your hypothesis?

Particularly when funding levels are low (as they currently are), uninspired "copy-paste" science or projects that are too speculative and off-ground most certainly won't be funded (Bourne & Chalupa, 2006).

Be passionate about your ideas. If you are not thrilled about your work or feel in doubt, it's probably not a good idea to go for a grant at this stage.

INSIDE SCOOP

Where to find inspiration?

Google Scholar is an excellent starting point for keyword search. Access Google Scholar from within the university network to download papers directly from the publishers' websites using the subscription of your institution. Scholar also lists referencing papers, allowing you to follow the development of new ideas and research strands based on an original publication.

Microsoft Academic is similar to Google Scholar, allowing you to search for academic papers and publications.

Loop by Frontiers is the first research network integrating all journals and academic websites, making researchers discoverable across the boundaries of publishers and organizations. This is an excellent resource if you would like to examine the activity of researchers and teams at a certain location or in a specific research field.

ResearchGate connects researchers across the globe, making it easy for you to share and access scientific output, knowledge, and expertise. On ResearchGate you can certainly find inspiration, phrase scientific questions and project ideas to the community, or contact researchers directly.

LinkedIn offers excellent tools to follow the activity of grant agencies as well as fellow researchers or groups with a dedicated focus on your scientific field of interest.

It is always a wise decision to stick to realistic goals - pursue ideas that you can actually accomplish in reasonable time and with predictable budget. Solving global diseases might sound like an excellent long-term research endeavor, however it might be hard to accomplish with the help of existing funding schemes.

To be on the safe side, break the global idea into smaller units and compartmentalize it into achievable milestones. The more realistic your idea is, the more likely it will get funded.

Consider this phase as an opportunity to have an impact. It is your chance to communicate your ideas to peers and mentors. Phrase your research questions theoretically first, and specify over time. The more concrete your ideas are stated, the easier it will be to measure and analyze their effects while at the same time controlling for unwanted side effects.

Great ideas need wings ...
and landing gear.

(C.D. Jackson, 1902 - 1964)

2

Find the right funding program

All funding agencies have websites where you can get an overview of all ongoing funding schemes and strands and find suitable programs.

Here is how it goes: Typically, funding programs are announced online in the form of a *Program Announcement (PA*) or R*equest for Application (RFA)*. These documents describe the area of interest for the agency along with general guidelines for conducting the research. If your project idea does not fit a particular program, save your time and resources. Instead, apply elsewhere to guarantee a programmatic fit between your idea and the desired outcomes of the grant agency.

>> Funding agencies *want* to give away money and are happy to help with questions you might have. Don't hesitate and contact their staff whenever you would like to get detailed information about a specific program that's not fully addressed on their website.

Now how can you determine whether the program fits you?

>> **Study the Request for Application (RFA)**. Understand the directions outlined in the RFA, the key components, goals, and areas of emphasis. Build your proposal on these elements.

>> **Check previously funded projects.** Find and carefully read abstracts of previously funded projects. They are a great source of information. You can search NSF-funded projects on the NSF website, for example.

>> **Contact colleagues and supervisors** who received funding from a certain source. If your advisor or PI have successfully applied for a specific grant when they were in your current position, it certainly is helpful to ask for their opinion on which funding scheme might be the best fit for you. They can also put you in touch with their collaborators (in different departments or universities), spreading the word about your project and assisting you in localizing the most suitable application target.

>> **Participate in university trainings.** Your university might host dedicated training courses and information sessions on funding schemes as offered by the Office of Postdoctoral Affairs, for example.

>> **Call the Program Manager at the funding agency.** Commonly, each program has a Program Officer (also referred to as *Program Official* or *Program Administrator*) who manages grant portfolios. Present your idea to them and discuss the fit with the program priorities. Usually, Program Officers are scientists themselves, understanding your situation and being able to point you to local resources at your university.

INSIDE SCOOP

These websites offer meta-searches across several funding agencies and schemes:

Newton's List provides an interactive forum for funders and grant-seekers. The site is a free resource open to individuals searching for international funding and organizations looking to market their grants to an international audience. Newton's list is co-sponsored by NSF, providing information on current international funding opportunities for students and researchers working in natural and social science fields.

Grants.gov lists all current discretionary funding opportunities from 26 agencies of the United States government, including the National Institutes of Health, the National Science Foundation, the Department of Energy, and many others - in other words, all the most important public funders of research in the United States. Grants.gov is free and does not require a subscription.

The MIT Office of Sponsored Programs is also an excellent source to browse national funding opportunities.

The NSF Office of Extramural Research features a primary and an advanced search page, where you can search using a wide variety of advanced search criteria.

NSF offers a free search for all NSF funding programs. The NSF website does not require any subscription.

Grant Resource Center (GRC). The American Association of State Colleges and Universities (AASCU) offers a database customized to smaller institutions and staff assistance. A paid institutional membership is required for access.

GrantForward by the Illinois Research Information Service is monitoring grant opportunities of over 9,000 sponsors. The service is free for the University of Illinois (UI) community. Outside the UI system, a paid institutional subscription of $19 is needed for access.

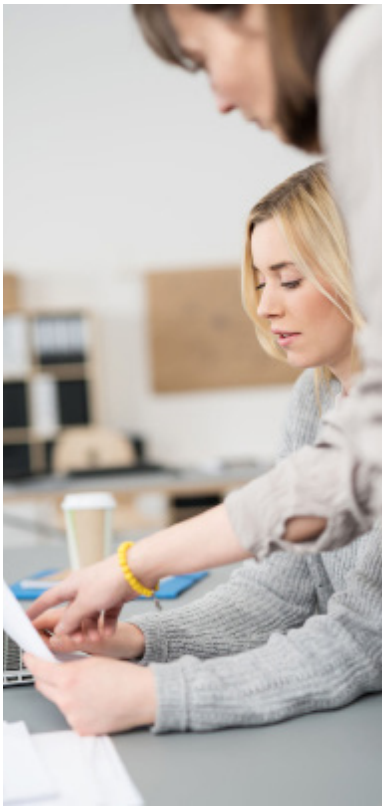
3

Carry out pilot studies

Running a pilot study with a small set of respondents is an excellent way to generate preliminary data that can be included in your proposal.

This allows you to not only get a feeling for whether or not your idea works (you might need to revise the experimental protocol), but also shows reviewers that your experimental approaches are solid and sound. This is particularly relevant for new applications where piloting data can serve as general proof of concept for your proposed project.

In case your pilot project and proposal involve human respondents, it is mandatory to contact the Institutional Review Board (IRB) / Independent Ethics Committee (IEC) at your institution as they will need to review and approve any of your experiments.



Why pilot studies?

Pilot studies are necessary for a successful application in several ways:

>> Run pilots to identify any issues and potential problems beforehand.

>> Run pilots to exclude factors and parameters that you did not consider before. Use the results to fine-tune your proposal.

>> Run pilots to show reviewers that you have the expertise to design studies as well as to collect, analyze, and interpret data.

4

Submit your work to peer-reviewed journals

Most likely, you will apply for grants after having spent some time at the lab, helping others doing their research, and collecting pilot data for yourself.

As your scientific publication record is a crucial assessment criterion, it is definitely recommend in preparation of a grant proposal to write up your recent work and submit it to peer-reviewed journals to be able to cite your research in your application as *submitted, in press (accepted)*, or *published* (do not include any of your work that is still *in preparation*).

INSIDE SCOOP

Publish or Perish

>> Anne-Wil Harzing, Professor of International Management at Middlesex University (London), is providing the free software Publish or Perish, which retrieves and analyzes academic citations for their impact. It has been designed to help you present evidence of the impact of your academic research. Definitely have a look at it!

Understand review and evaluation criteria

1

First Review

Your proposal is initially screened by the Program Officer, who accomplishes a complete non-technical review. Are all required documents attached? Are all requirements met? Are there any mistakes in spelling, grammar, and style? Also, the Program Officer screens the proposal for keywords. If the agency is funding projects on “immersive learning” in “virtual reality”, however your proposal is lacking these two keywords, it is rather unlikely that your application will make it to the second round.

2

Second Review

In the second phase, your proposal is evaluated technically by a panel of independent experts (in military funding agencies the review is often done by the Program Officers themselves). Their independent evaluations are based on the criteria listed in the *Request for Application (RFA)* and eventually aggregated into a single score.

3

Third Review

The Program Officer determines which projects can be funded within the given budget. If there’s two competing proposals, the project with the smaller funding request might be favored in order to prevent the overall budget from spilling over.

INSIDE SCOOP

Evaluation criteria

Most likely, your proposal will be evaluated based on the following aspects:

>> **Intellectual merit.** Has your project the potential to advance knowledge within its own field?

>> **Broader impacts.** Has your project the potential to benefit across other fields and contribute to the achievement of outcomes with respect to human resources in general?

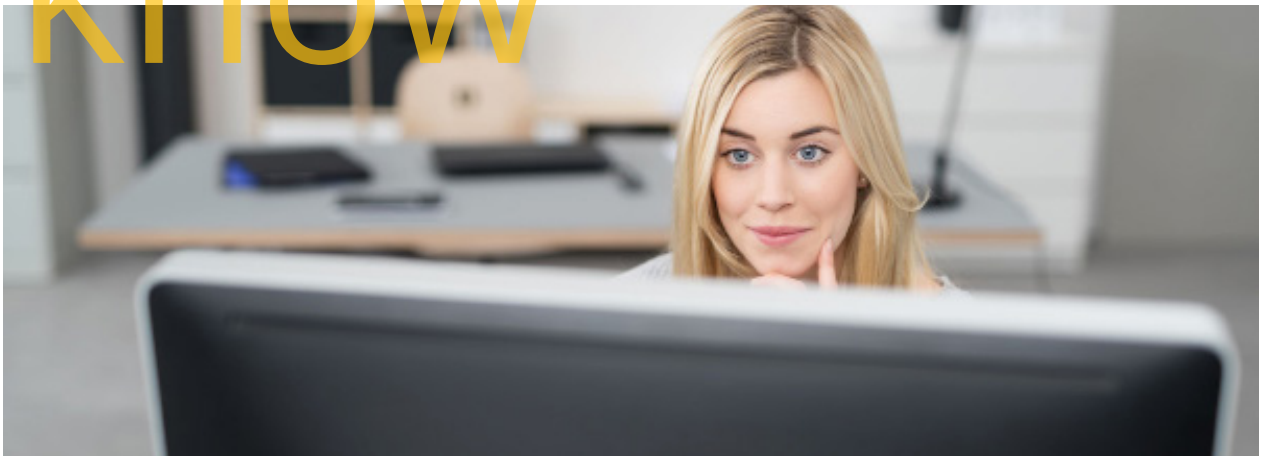
>> **Creativity.** To what extent do the proposed activities suggest and explore creative, original or potentially transformative concepts?

>> **Organization.** Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?

>> **Expertise.** How well are you qualified to conduct the proposed activities?

>> **Resources.** Are there adequate resources available (either at the home organization or through collaborations) to carry out the proposed activities.

know



>> *Make sure you understand program and evaluation criteria.*

Develop a timeline

Develop a timeline that helps you stay on track and allows you to wrap up your proposal in due time. Definitely factor in time buffers and give yourself the appropriate lead time. Keep in mind that piloting and pretesting require additional time resources.

If you rush the preparation of the proposal, it will show (and the reviewers will notice). Kraicer (2015) and Vilis (1995) recommend to stick to the following timeline and milestone plan:

12 MONTHS

before the deadline

Kick your mental gears and start thinking.

Brainstorm interesting projects that are in the tradition of existing theories and findings while at the same time being innovative:

>> Crawl online resources and start reviewing literature.

>> Touch base with colleagues and mentors to discuss project ideas and possible issues.

Always keep your scientific track record in mind as it is one of the most important elements of your proposal. Finish your ongoing experiments as soon as possible, write up papers, and submit them for publication.

Keep in mind:

Peer-review of submitted papers can easily take six months or more (dependent on potential revision).

What grant reviewers evaluate most is your *scientific impact*, generally represented by the number of published papers in peer-reviewed journals.

9 MONTHS
before the deadline

Run a pilot study to collect preliminary data:

>> Preliminary results will boost the likelihood of the proposal being funded.

>> Reviewers are critical and might consider a hundred reasons why one of your proposed ideas will not work. Any of these can be prevented if you can show that you have already taken care of them.

>> Small grants are excellent ways to demonstrate that you already received funding. They will enhance the success rate of your proposal.

6 MONTHS
before the deadline

Draft and initial version of the main proposal section. Be aware that this can take four weeks of very intense work. Block this time off well in advance, and do not schedule anything else.

>> The main proposal section might be best tackled in one continuous block of time. Plan in up to six hours per day each day of the week. You will not get it done in time if you only work a few hours a week on it.

5 MONTHS
before the deadline

Obtain feedback from your colleagues.

>> Scientific colleagues who can serve as subject matter experts and are similar to your reviewers are particularly valuable.

>> Hand your proposal to someone who is an expert editor, spotting spelling and grammar mistakes, wording and phrasing issues on the fly.

>> Take the time to sit down with them and discuss any and all issues and flaws. Pay attention to what they did not understand. Revise and follow up.

>> Give yourself the time to look at the proposal again with a fresh eye. Twist and tweak, let your proposal incubate and improve.

4 MONTHS

before the deadline (earlier at some institutions)

Submit your proposed experiments to the *Institutional Review Board (IRB) / Independent Ethics Committee (IEC)* for approval.

2 MONTHS

before the deadline

Grab your proposal and read again the guidelines. Carefully check the instructions. Work on other parts:

>> Get equipment quotations - hardware and sensors, software, other devices.

>> Get letters of confirmation from collaborators.

>> Get the budget finalized.

1 MONTHS
before the deadline

Put together what appears to you as the final version of the proposal, including figures and references as well as official forms. Hand it to colleagues for final review.

2 WEEKS
before the deadline

Generate the final version. Do a thorough proof-reading, and also hand it to someone who has not seen it before (you might have gone blind for typos and spelling errors). Do not trust the spell checker.
Be sure to check formatting requirements (some agencies require .doc while others request .pdf).

1 WEEK
before the deadline

Get all required signatures. Assemble all required copies. Keep in mind that the copy machine might be occupied or defective.

2 DAYS
before the deadline

Submit the proposal electronically or by express mail/courier.

Get some rest (and coffee).

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What to write:

PROPOSAL ELEMENTS

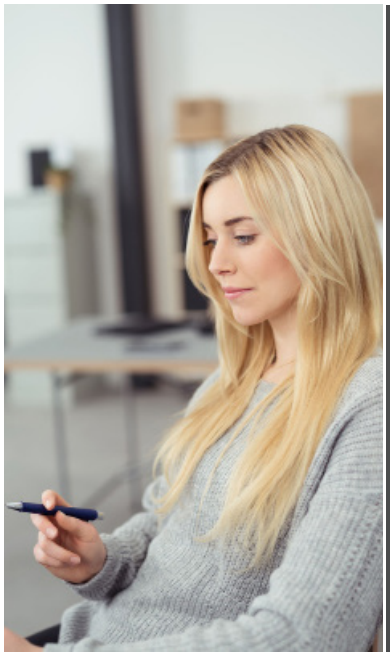
What to write: Proposal elements

Often, the difference between success and failure lies not only in the quality of the science behind your idea, but also in the quality of the proposal itself. Simply put: To make a lasting impression, your idea needs a nice, well-crafted wrapping.

> Good writing will not save ideas, but bad writing will kill good ones.
>
> *(J, Kraicer, 2015; p.1)*

When you compare grant applications and scientific papers, you will notice that successful proposals share the following characteristics:

- >> The writing is more energetic, positive, direct, and concise.
- >> Sentences are shorter, key phrases, and elements are highlighted.
- >> The subject matter is easy to understand, with fewer highly technical terms.
- >> Figures and tables are placed consciously.



Start with a good idea - then improve the packaging

>> Often, good ideas are not funded because they are not packaged well.

>> For every good idea that is funded there are others that are not, simply because they are not packaged well.

>> Poor ideas will not be successful regardless of how well they are packaged.

What goes into a proposal?

An excellent grant proposal is well-prepared, thoughtfully planned, and concisely packaged. Typically, grant proposals contain the following elements:

1. First page (title page)
2. Abstract (summary)
3. Project description
4. Budget information
5. Biosketch(es)

The following pages will take a closer look at the main purpose and characteristics of each proposal element and provide quick tips that will help you master the individual sections.

1 First page (title page)

Fill in the cover page completely and accurately (up to 10% of all applications have something missing from this page):

QUICK TIPS

>> Obtain all signatures.

>> Use a distinct, descriptive, and appropriate title for your project. Use a two-part title as it can easily be repurposed across applications, for example:

part 1: "*Multisensory data collection in immersive learning environments*" (general).

part 2: *"Effects of cognitive load on facial expressions and EEG theta frequency power in classroom student populations"* (more specific, more targeted towards the Program Announcement).

2

Abstract (summary)

The project abstract is the most important section of your proposal as it typically is the only section that every reviewer reads. It is supposed to describe your project as concisely, accurately, and logically as possible, mostly limited to a single page. Make sure that the abstract is not just a simple summary of the proposal but stands on its own and can be understood even if separated from the rest of the application.

QUICK TIPS

>> Take the summary seriously.
Write it last.

>> It is the first part that is read by the Program Officer. It sets the first impression and determines who will review it.
Remember that it will be read both by experts who know your research field and by those who don't

>> Include hypotheses, objectives, procedures, research plan, timeline, and significance.

>> State long-term objectives and concrete aims (+ hypotheses).

>> Connect your proposal to the *Program Announcement (PA)* and *Request for Application (RFA).*

>> Present why your proposal is unique, relevant, significant, and why it needs to be supported.

3 Project description

The project description contains the following elements:

>> **Background and significance.** Focus on the three questions:

1. What is known?
2. What is unknown?
3. Why is it essential to find out?

Critically evaluate existing studies and be aware that your reviewers might have contributed significantly to the existing state of knowledge. Link your current project to the missing aspects of previous research and make clear how your project will result in an advancement of the field.

>> **Specific aims & intellectual merit.** Explain how and why your current project has the potential to advance knowledge in your specific field. Phrase the intellectual merit in an impersonal and objective way, sequentially and logically. Do not include any first person references or value judgments about the merits of your work – that is for the reviewers to decide.

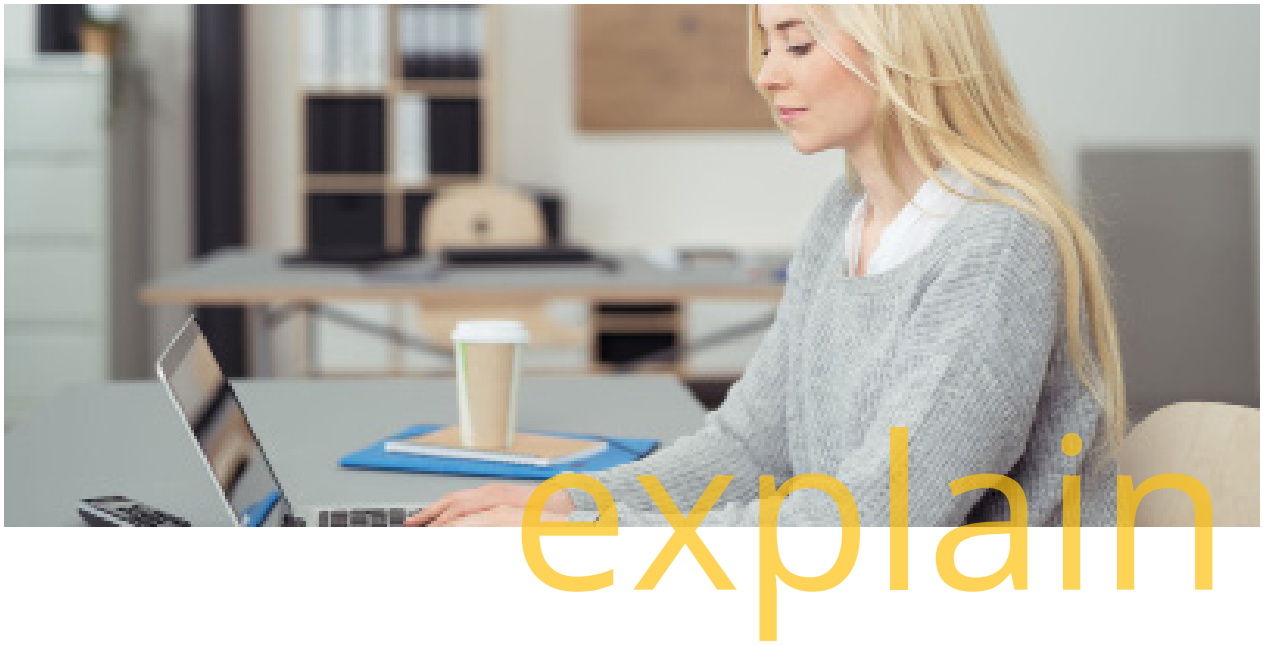
>> **Broader impact.** Address in this section the broader impact of your research on neighboring fields, science and technology in general, the overall well-being of individuals and society or relationships between academia, industry, and others.

>> **Pilot & preliminary data.** Show preliminary/pilot data to document your credibility and research experience. Pilot data helps reviewers understand that you considered side effects and hidden factors.

>> **Hypothesis and long-term objectives.** Phrase hypotheses that can be quantified and tested. Explain how your current question has impact on long-term objectives. Why is your research significant and relevant?

>> **Research design and methods.** Describe how you want to test the hypotheses and how you will fulfill the specific aims. Outline the research method and design to accomplish each aim and explain the rationale. Describe data collection, analysis, and interpretation. If you apply novel techniques, explain why they are superior to existing methods.

>> *Make sure to explain thoroughly how you plan to collect and analyze the data.*



4

Budget & timeline

Inexperienced writers typically propose too much and misestimate time and monetary limitations.

Always make sure to prepare a budget with strong justifications, avoiding reviewers' impression that your project is overly ambitious or lacks focus. Make use of a project timeline and explicitly list the amount of time you and your colleagues will spend carrying out each portion of the project. Remember to align your budget with the agency's guidelines in the *Program Announcement (PA) / Request for Application (RFA)* – your proposal will be judged on the degree of reasonableness.

Mention and document how your home institution will assist you in running the project (for example, providing resources that are not directly covered by the funding scheme).

5

Biosketch(es)

In this section, biosketches of all project members are listed (typically one page per person), including their contact details, current and previous positions as well as a list of their publications and contributions to science that are considered crucial for the current proposal.

The biosketch section is supposed to highlight your and your colleagues' expertise and skills in the field. Sometimes personal statements can be added, allowing you to describe your professional and academic profile in more detail. Most likely, you can repurpose this section across several grant applications.

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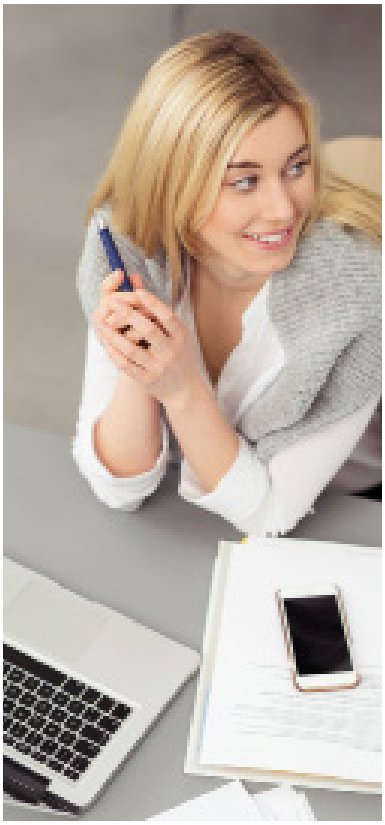
How to write:

STYLE AND LAYOUT

How to write: Style and layout

There's a couple of simple tricks that can boost the readability of your proposal, making it much easier and fun to read for eviewers. If you present your ideas in an overly complicated way, they might lose track and skip core aspects of your proposal (Bourne & Chalupa, 2006).

Remember: Your reviewers are your strongest advocates. Provide them with the best reading experience possible.



Reviewers are people, too.

>> Reviewers are people like you and me - they might do their review task over and above their daily mandated activities, on evenings, weekends, holidays or when commuting back home. They might wait until the last minute to begin their review and or accomplish it in bits and pieces.

You certainly want the reviewers to be your enthusiastic champions. Make sure to refer to RFA requirements clearly. Logically prepare and well structure your proposal to make the reviewers' lives a bit easier (and yours) - after all, if you make them think too hard to grasp your idea, your chances of getting funded move towards zero.

The next pages describe which guidelines you should follow in order to improve the readability of your proposal and gain the reviewers' interest *and* approval.

1

Obey the three C's - concise, clear, and complete

Write the proposal logically and clearly. Keep in mind that you will always have less space than you would want, so explain your project exhaustively, yet as brief as possible. Make sure to describe all central aspects of your project, but do not fill the maximum page count if you can communicate the rationale of your research within fewer pages.

Specify the scope up-front and build an architecture that always routes back. How is your central idea reflected in the theoretic introduction? How does it affect your experimental paradigm or your budget? Breadcrumbs that all link back to your core proposition will help reviewers immensely as they show your strength in binding all together.

COMMON MISTAKES

- >> You forget to explain why your project is needed, and what the specific aims or objectives are to test your hypothesis.
- >> You do not describe potential outcomes, conclusions, and implications.
- >> You do not properly describe the background of the field, leaving out core references and publications.
- >> You do not describe your own preliminary/pilot data, proposed sample sizes or statistical tests.
- >> You use the catch-phrases *cutting-edge* and *innovative* throughout, without stating hypotheses, experimental designs, budgets, and goals.
- >> Your proposal is not aligned with the funding agency's *Program Announcement (PA)/Request for Application (RFA),* or contains copy-pasted text from other proposals without adapting passages and key words to the current funding scheme.
- >> Your proposal contains mistakes in spelling, grammar, and style.

2 Make it visually appealing

Use line spacing between paragraphs and set margins to 0.8 or 0.9 inch. Keep paragraphs in a reasonable length and try to use four or more paragraphs per page. Provide white space generously (also to the right and left), avoid dense text blocks and text wrapping. Obey to standards expected by the agencies – for example, NIH highlights their format requirements on their Write Your Application website.

COMMON MISTAKES

>> You use several type styles conjunctively. Your paragraphs contain sentences that are **bold**-faced, ALL-CAPITALIZED, *italic* and underlined.

>> You write in 9-point Times New Roman, single-spaced without spaces between paragraphs, headings, or subheadings.

3 Structure, structure, structure

Make use of subheadings and a numbering system that ties it all together. Use bold only for subheadings, or for the most important topic sentences. Start each section with a summary of the key points. Remember: Reviewers might not read your proposal in one piece, and often parallel to other applications (and their own work) - any guidance that you offer them will be appreciated as they can skip back and forth without losing focus on the relevant information.

COMMON MISTAKES

>> You do not use any subheadings.

>> You use subheadings inconsistently. For example, you start off by listing goals I, II, and III, but then label your experiments (a) through (h) without any obvious relationship to the goals.

4

Avoid jargon

Reviewers might come from other research fields, so don't rely on unexplained jargon. According to Henson (2004), scientists want their work to appear scholarly, so they habitually inflate their prose with large words and complicated sentences to achieve the effect of serious thinking. However, such tactics can have the opposite effect on readers.

COMMON MISTAKES

>> You use lots of acronyms, and define them several pages after you first use them (or do not explain them at all).

>> You use lots of jargon. Instead of *use* you write *utilize*, instead of *method* you say *methodological technique*, making it hard for reviewers from other fields to grasp your idea quickly.

clear

>> *Don't be poetic. Keep your wording short, crisp, and clear.*

4

Cite with style

When formulating the motivation for your proposed project, make sure to cite all relevant work. As stated by Bourne & Chalupa (2006), your reviewers might be experts in your field, so not citing their work at all or citing them not appropriately will give them the impression that you did not do your homework. Therefore, make sure to reference your current ideas to existing research theories and findings.

Additionally to listing references in your text, you certainly want to cite them correctly and according to established standards. Citation standards define the format of references in the continuous text as well as in the bibliography/list of references. Be aware, though: Unlike a research paper, you may be limited to the number of citations in your grant application - choose wisely and pick those that are well known or support your work.

>>

American Psychological Association (APA)
This style is most commonly used within the social sciences. The complete APA publication manual can be downloaded from their website.

Text: Data was collected using iMotions Biometric Research Platform (2016).

Reference: iMotions Biometric Research Platform (version 6.1) [Computer software]. (2016). Copenhagen, Denmark: iMotions A/S.

>>

Institute of Electrical and Electronics Engineers (IEEE)
The IEEE citation reference can be downloaded from their website.

Text: Data was collected using [1].

Reference: [1] iMotions Biometric Research Platform version 6.1. Copenhagen, Denmark: iMotions A/S, 2016.

INSIDE SCOOP

Automate the formatting of your literature database.

Different grant applications require different reference formatting. Of course you can do all the editing manually. This. however, takes time and is prone to errors.

Instead, make use of software for automatic, on-the-fly formatting of your literature database in a consistent way, for example in Microsoft Word or Apache OpenOffice.

The two most widely used ones are:

EndNote (Thomson Reuters) is a commercial reference management software package, used to manage bibliographies and references when writing essays and articles. EndNote offers a plugin for Word and OpenOffice, and can import/export citation libraries, for example, from Google Scholar. Also, EndNote can be used for literature search based on keywords.

Mendeley (Elsevier). Available for students and researchers, Mendeley is a bibliography software maintaining your literature database. It allows for online literature search and exports formatted citations into Word or EndNote.

5

Include graphics and figures

Captivating and engaging grant proposals not only use text, but also place figures, images, and tables in order to convey preliminary/pilot results, your background, and approach and thinking. Use figure legends consciously, and highlight the significance of the figure for your proposal, for example, by marking the significant effect that justifies the proposed project.

Figures and tables serve as visual aids for the reviewers to understand your proposal as best as possible. Use graphs to delineate your long-term objective and your specific aims as well as a timeline, your hypotheses, and methods. Feel encouraged to include relevant decision trees, flow charts examples, and pictures as they will subserve the overall impression of structure and completeness.

QUICK TIPS

Never copy-paste a figure from your own or other publications.
Figures should be customized to the grant application.

>> Add legends and scale bars.

>> Annotate figures and highlight key elements.

>> Scale text for readability.

>> Use colors for intuitive understanding.

>> Write a good caption.

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OUTLOOK

The time after submission

Once you have submitted your proposal, it is certainly not the time to just sit around and wait. Remember that the review process can easily take six to twelve months, with additional time passing until the funds are disbursed and you can get started purchasing soft- and hardware, paying off your colleagues, and reimbursing respondents. Ideally, you are notified that the reviewers were thrilled by your application, and that funding begins at the designated start date. Congratulations! In this case, you might want to check out NIH's advice on how to manage your grant.

However, rejection is inevitable, even for applications with solid scientific background and excellent packaging. Rejection does not mean that your ideas are not worth funding. Instead, funding levels in the current round might have been too low to support your proposal.

The main advice is to keep trying. Always check if a re-submission is possible – slight changes might turn the tide. If possible, ask why the proposal was rejected: Are other programs more suitable for resubmission? Was my budget appropriate? Can I improve any of the scientific project sections? Address each of the emphasized aspects with facts, and make it clear in the resubmission that you understand what was wrong with the proposal in the first place. Indicate exactly how you overcame the issues, and why the updated version is much improved.

Don't feel intimidated by the excessive workload that flows into assembling all the bits and pieces that make up your proposal. Take one step at a time and … smile.

Everything is theoretically impossible, until it's done.

(Robert A. Heinlein)

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RESOURCES

Resources

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