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Editorial

Ten Simple Rules for Getting Published

Philip E. Bourne

The student council (http://www.iscbsc.org/) of the International Society for Computational Biology asked me to present my thoughts on getting published in the field of computational biology at the Intelligent Systems in Molecular Biology conference held in Detroit in late June of 2005. Close to 200 bright young souls (and a few not so young) crammed into a small room for what proved to be a wonderful interchange among a group of whom approximately one-half had yet to publish their first paper. The advice I gave that day I have modified and present as ten rules for getting published.

Rule 1: Read many papers, and learn from both the good and the bad work of others.

It is never too early to become a critic. Journal clubs, where you critique a paper as a group, are excellent for having this kind of dialogue. Reading at least two papers a day in detail (not just in your area of research) and thinking about their quality will also help. Being well read has another potential major benefit—it facilitates a more objective view of one's own work. It is too easy after many late nights spent in front of a computer screen and/or laboratory bench to convince yourself that your work is the best invention since sliced bread. More than likely it is not, and your mentor is prone to falling into the same trap, hence rule 2.

Rule 2: The more objective you can be about your work, the better that work will ultimately become.

Alas, some scientists will never be objective about their own work, and will never make the best scientists—learn objectivity early, the editors and reviewers have.

Rule 3: Good editors and reviewers will be objective about your work.

The quality of the editorial board is an early indicator of the review process. Look at the masthead of the journal in which you plan to publish. Outstanding editors demand and get outstanding reviews. Put your energy into improving the quality of the manuscript *before submission*. Ideally, the reviews will improve your paper. But they will not get to imparting that advice if there are fundamental flaws.

Rule 4: If you do not write well in the English language, take lessons early; it will be invaluable later.

This is not just about grammar, but more importantly comprehension. The best papers are those in which complex ideas are expressed in a way that those who are less than immersed in the field can understand. Have you noticed that the most renowned scientists often give the most logical and simply stated yet stimulating lectures? This extends to their written work as well. Note that writing clearly is valuable, even if your ultimate career does not hinge on producing good scientific papers in English language journals. Submitted papers that are not clearly written in good English, unless the science is truly outstanding, are often rejected or at best slow to publish since they require extensive copyediting.

Rule 5: Learn to live with rejection.

A failure to be objective can make rejection harder to take, and you will be rejected. Scientific careers are full of rejection, even for the best scientists. The correct response to a paper being rejected or requiring major revision is to listen to the reviewers and respond in an objective, not subjective, manner. Reviews reflect how your paper is being judged—learn to live with it. If reviewers are unanimous about the poor quality of the paper, move on—in virtually all cases, they are right. If they request a major revision, do it and address every point they raise both in your cover letter and through obvious revisions to the text. Multiple rounds of revision are painful for all those concerned and slow the publishing process.

Rule 6: The ingredients of good science are obvious—novelty of research topic, comprehensive coverage of the relevant literature, good data, good analysis including strong statistical support, and a thought-provoking discussion. The ingredients of good science reporting are obvious—good organization, the appropriate use of tables and figures, the right length, writing to the intended audience—do not ignore the obvious.

Be objective about these ingredients when you review the first draft, and do not rely on your mentor. Get a candid opinion by having the paper read by colleagues without a vested interest in the work, including those not directly involved in the topic area.

Rule 7: Start writing the paper the day you have the idea of what questions to pursue.

Some would argue that this places too much emphasis on publishing, but it could also be argued that it helps define scope and facilitates hypothesis-driven science. The temptation of novice authors is to try to include everything they know in a paper. Your thesis is/was your kitchen sink. Your papers should be concise, and impart as much information as possible in the least number of words. Be familiar with the guide to authors and follow it, the editors and reviewers do. Maintain a good bibliographic database as you go, and read the papers in it.

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Rule 8: Become a reviewer early in your career.

Reviewing other papers will help you write better papers. To start, work with your mentors; have them give you papers they are reviewing and do the first cut at the review (most mentors will be happy to do this). Then, go through the final review that gets sent in by your mentor, and where allowed, as is true of this journal, look at the reviews others have written. This will provide an important perspective on the quality of your reviews and, hopefully, allow you to see your own work in a more objective way. You will also come to understand the review process and the quality of reviews, which is an important ingredient in deciding where to send your paper.

Rule 9: Decide early on where to try to publish your paper.

This will define the form and level of detail and assumed novelty of the work you are doing. Many journals have a presubmission enquiry system available—use it. Even before the paper is written, get a sense of the novelty of the work, and whether a specific journal will be interested.

Rule 10: Quality is everything.

It is better to publish one paper in a quality journal than multiple papers in lesser journals. Increasingly, it is harder to hide the impact of your papers; tools like Google Scholar and the ISI Web of Science are being used by tenure committees and employers to define metrics for the quality of your work. It used to be that just the journal name was used as a metric. In the digital world, everyone knows if a paper has little impact. Try to publish in journals that have high impact factors; chances are your paper will have high impact, too, if accepted.

When you are long gone, your scientific legacy is, in large part, the literature you left behind and the impact it represents. I hope these ten simple rules can help you leave behind something future generations of scientists will admire. ■

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Editorial

Ten Simple Rules for Getting Grants

Philip E. Bourne*, Leo M. Chalupa

This piece follows an earlier Editorial, "Ten Simple Rules for Getting Published" [1], which has generated significant interest, is well read, and continues to generate a variety of positive comments. That Editorial was aimed at students in the early stages of a life of scientific paper writing. This interest has prompted us to try to help scientists in making the next academic career step—becoming a young principal investigator. Leo Chalupa has joined us in putting together ten simple rules for getting grants, based on our many collective years of writing both successful and unsuccessful grants. While our grant writing efforts have been aimed mainly at United States government funding agencies, we believe the rules presented here are generic, transcending funding institutions and national boundaries.

At the present time, US funding is frequently below 10% for a given grant program. Today, more than ever, we need all the help we can get in writing successful grant proposals. We hope you find these rules useful in reaching your research career goals.

Rule 1: Be Novel, but Not Too Novel

Good science begins with new and fresh ideas. The grant writing process should be a pleasure (no, we are not kidding), for it allows you to articulate those ideas to peers who have to read your grants but not necessarily your papers. Look at grant writing as an opportunity to have an impact. Feel passionate about what you are writing—if you are not passionate about the work, it is probably not a good grant and is unlikely to get funded. "Me-too" science will not get funded when funding levels are low. On the other hand, science that is too speculative will not be supported either, particularly when funds are tight—sad but true.

Rule 2: Include the Appropriate Background and Preliminary Data as Required

You need to convince reviewers that the work you propose needs to be done and that you are the best person to do it. Different granting programs require differing amounts of preliminary data. For certain programs, it can be said that the work must be essentially done before the grant is awarded, and that the funds are then used for the next phase of the research program. There is some truth in this. So where appropriate, do provide some tantalizing preliminary result, making sure to tell the reviewers what these results imply with respect to the specific aims of your proposal. In formulating the motivation for your proposal, make sure to cite all relevant work—there is nothing worse than not appropriately citing the work of a reviewer! Finally, convince the reviewer that you have the technical and scientific background to perform the work as proposed.

Rule 3: Find the Appropriate Funding Mechanism, Read the Associated Request for Applications Very Carefully, and Respond Specifically to the Request

Most funding organizations have specific staff to assist in finding funding opportunities, and most funding agencies have components of their Web sites designed to help investigators find the appropriate programs. Remember, programs want to give away money—the jobs of the program's staff depend on it. The program staff can help you identify the best opportunities. If your grant does not fit a particular program, save your time and energy, and apply elsewhere, where there is a better programmatic fit.

Rule 4: Follow the Guidelines for Submission Very Carefully and Comply

Many funding bodies will immediately triage grants that do not comply with the guidelines—it saves the program time and money. This extends to all the onerous supporting material—budget justification, bibliographies, etc. Get them right and keep them updated for future applications. Even if it goes to review, an inappropriately formulated application may aggravate the reviewers, and will have a negative impact even if the science is sound. Length and format are the most frequent offenders.

Rule 5: Obey the Three Cs—Concise, Clear, and Complete

The grant does not have to fill the allotted page count. Your goal should be to provide a complete reckoning of what is to be done, as briefly as possible. Do not rely on supplements (which may not be allowed) or on Web sites (review may be actively discouraged since it has the potential to compromise anonymity). Specify the scope up-front and make sure it is realistic with respect to the funds requested. A common temptation for inexperienced grant writers is to propose to do too much. Such applications are usually judged as overly ambitious and consequently poorly rated.

Rule 6: Remember, Reviewers Are People, Too

Typically, reviewers will have a large number of grants to review in a short period. They will easily lose concentration and miss key points of your proposal if these are buried in an overly lengthy or difficult-to-read document. Also, more than likely, not all the reviewers will be experts in your

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discipline. It is a skill to capture the interest of experts and nonexperts alike. Develop that skill. Unlike a paper, a grant provides more opportunity to apply literary skills. Historical perspectives, human interest, and humor can all be used judiciously in grants to good effect. Use formatting tricks (without disobeying rule 4), for example, underlining, bolding, etc., and restate your key points as appropriate. Each section can start with a summary of the key points.

Rule 7: Timing and Internal Review Are Important

Give yourself the appropriate lead time. We all have different approaches to deadlines. Ideally, you should complete a draft, leave sufficient time to get feedback from colleagues, and then look at the grant again yourself with a fresh eye. Having a spectrum of scientific colleagues who are similar to the likely reviewer pool critique your grant is very valuable.

Rule 8: Know Your Grant Administrator at the Institution Funding Your Grant

At the end of the day, this person is your best advocate. How well you understand each other can make a difference. Many grant administrators have some measure (limited to complete) discretionary control over what they fund. The more they know and understand you and your work, the better your chances of success. Do not rely just on E-mail to get to know the grant administrator. Do not be intimidated. Talk to them on the telephone and at meetings where possible—they want to help.

Rule 9: Become a Grant Reviewer Early in Your Career

Being on review panels will help you write better grants. Understanding why grants get triaged before complete review, how a panel reacts to a grant, what the discretionary role of program officers is, and what the role of oversight councils is provide valuable lessons for writing successful grants of your own and for giving others advice about this process.

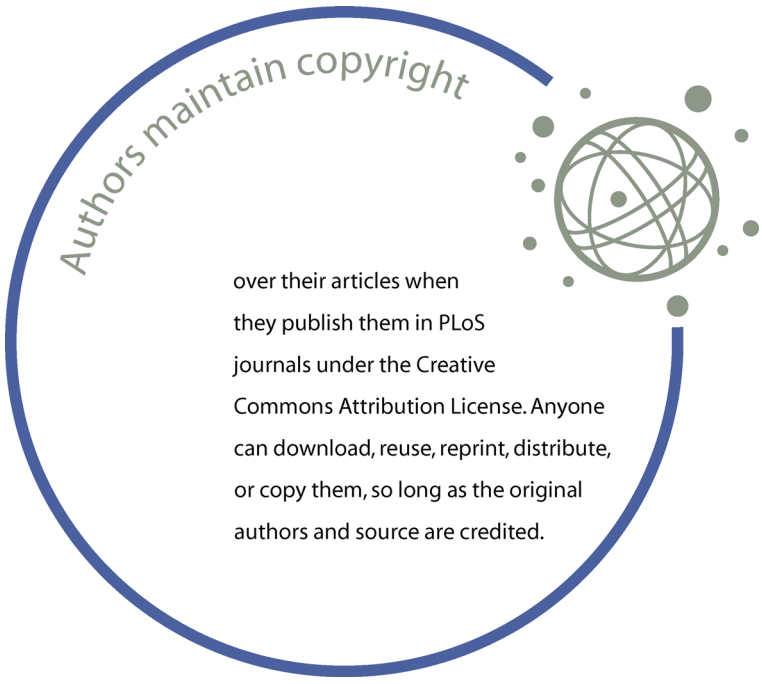
Rule 10: Accept Rejection and Deal with It Appropriately

Rejection is inevitable, even for very good grants when funding levels are low. Learn to live with rejection and to respond appropriately. Do not be defensive; address each criticism head on and respond with facts and not emotional arguments. When resubmission is necessary, make it very clear to the reviewer that you understand what was wrong the first time. Indicate precisely how you have fixed the problems. In the resubmitted application, never argue with the validity of the prior review. If the grant was close to being funded the first time around, remind the reviewers of that fact by including the previous score if appropriate, and make it crystal clear why this version is much improved.

There are no previously unrevealed secrets to grant writing presented here. Rather, it is a concise picture intended to help our early career readers take the next step. If you feel like you need more detail, take a look at Kraicer's article [2]. Good luck on getting those grants. ■

References

1. Bourne PE (2005) Ten simple rules for getting published. PLoS Comput Biol 1: DOI: 10.1371/journal.pcbi.0010057
2. Kraicer J (1997) The art of grantmanship. Strasbourg: Human Frontier Science Program. Available: http://www.hfsp.org/how/ArtOfGrants.htm. Accessed 19 January 2006.



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Editorial

Ten Simple Rules for Reviewers

Philip E. Bourne*, **Alon Korngreen**

Last summer, the Student Council of the International Society for Computational Biology prompted an Editorial, "Ten Simple Rules for Getting Published" [1]. The interest in that piece (it has been downloaded 14,880 times thus far) prompted "Ten Simple Rules for Writing a Grant" [2]. With this third contribution, the "Ten Rules" series would seem to be established, and more rules for different audiences are in the making. *Ten Simple Rules for Reviewers* is based upon our years of experience as reviewers and as managers of the review process. Suggestions also came from PLoS staff and Editors and our research groups, the latter being new and fresh to the process of reviewing.

The rules for getting articles published included advice on becoming a reviewer early in your career. If you followed that advice, by working through your mentors who will ask you to review, you will then hopefully find these *Ten Rules for Reviewers* helpful. There is no magic formula for what constitutes a good or a bad paper—the majority of papers fall in between—so what do you look for as a reviewer? We would suggest, above all else, you are looking for what the journal you are reviewing for prides itself on. Scientific novelty—there is just too much "me-too" in scientific papers—is often the prerequisite, but not always. There is certainly a place for papers that, for example, support existing hypotheses, or provide a new or modified interpretation of an existing finding. After journal scope, it comes down to a well-presented argument and everything else described in "Ten Simple Rules for Getting Published" [1]. Once you know what to look for in a paper, the following simple reviewer guidelines we hope will be useful. Certainly (as with all *PLoS Computational Biology* material) we invite readers to use the PLoS eLetters feature to suggest their own rules and comments on this important subject.

Rule 1: Do Not Accept a Review Assignment unless You Can Accomplish the Task in the Requested Timeframe—Learn to Say No

Late reviews are not fair to the authors, nor are they fair to journal staff. Think about this next time you have a paper under review and the reviewers are unresponsive. You do not like delays when it is your paper, neither do the authors of the paper you are reviewing. Moreover, a significant part of the cost of publishing is associated with chasing reviewers for overdue reviews. No one benefits from this process.

Rule 2: Avoid Conflict of Interest

Reviews come in various forms—anonymous, open, and double-blind, where reviewers are not revealed to the authors and authors are not revealed to reviewers. Whatever the process, act accordingly and with the highest moral principles. The cloak of anonymity is not intended to cover scientific misconduct. Do not take on the review if there is the slightest possibility of conflict of interest. Conflicts arise when, for example, the paper is poor and will likely be rejected, yet there might be good ideas that you could apply in your own research, or, someone is working dangerously close to your own next paper. Most review requests first provide the abstract and then the paper only after you accept the review assignment. In clear cases of conflict, do not request the paper. With conflict, there is often a gray area; if you are in any doubt whatsoever, consult with the Editors who have asked you to review.

Rule 3: Write Reviews You Would Be Satisfied with as an Author

Terse, ill-informed reviews reflect badly on you. Support your criticisms or praise with concrete reasons that are well laid out and logical. While you may not be known to the authors, the Editor knows who you are, and your reviews are maintained and possibly analyzed by the publisher's manuscript tracking system. Your profile as a reviewer is known by the journal—that profile of review quality as assessed by the Editor and of timeliness of review should be something you are proud of. Many journals, including this one, provide you with the reviews of your fellow reviewers after a paper is accepted or rejected. Read those reviews carefully and learn from them in writing your next review.

Rule 4: As a Reviewer You Are Part of the Authoring Process

Your comments, when revisions are requested, should lead to a better paper. In extreme cases, a novel finding in a paper on the verge of rejection can be saved by (often) multiple rounds of revision based on detailed reviewers' comments and become highly cited. You are an unacknowledged partner in the success of the paper. It is always beneficial to remember that you are there to help the authors in their work, even if this means rejecting their manuscript.

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Rule 5: Be Sure to Enjoy and to Learn from the Reviewing Process

Peer review is an important community service and you should participate. Unfortunately, the more you review, in all likelihood the more you will be asked to review. Often you will be asked to review boring papers that are of no interest to you. While it is important to serve as a reviewer, only accept papers in which you are keenly interested, because either they are close to your area of research or you feel you can learn something. You might say, should I not know the work very well to be a reviewer? Often a perspective from someone in a slightly different area can be very effective in improving a paper. Do not hesitate to indicate to the Editor the perspective that you can bring to a paper (see Rule 10); s/he can then decide how to weigh your review. Editors would of course like to see you review papers even if you are not particularly interested in them, but the reality is that good reviewers must use their reviewing time wisely.

Rule 6: Develop a Method of Reviewing That Works for You

This may be different for different people. A sound approach may be to read the manuscript carefully from beginning to end before considering the review. This way you get a complete sense of the scope and novelty of the work. Then read the journal's Guide to Authors, particularly if you have not published in the journal yourself, or if the paper is a particular class of article with which you are not overly familiar, a review for example. With this broad background, you can move to analyzing the paper in detail, providing a summary statement of your findings as well as detailed comments. Use clear reasoning to justify each criticism, and highlight the good points about the work as well as the weaker points. Including citations missed by the author (not your own) is often a short but effective way to help improve a paper. A good review touches on both major issues and minor details in the manuscript.

Rule 7: Spend Your Precious Time on Papers Worthy of a Good Review

The publish-or-perish syndrome leads to many poor papers that may not be filtered out by the Editors prior to sending it out for review. Do not spend a lot of time on poor papers (this may not be obvious when you take on the paper by reading only the abstract), but be very clear as to why you have spent limited time on the review. If there are positive aspects of a poor paper, try to find some way of encouraging the author while still being clear on the reasons for rejection.

Rule 8: Maintain the Anonymity of the Review Process if the Journal Requires It

Many of us have received reviews where it is fairly obvious who reviewed the work, sometimes because they suggest you cite their work. It is hard to maintain anonymity in small scientific communities, and you should reread your review to be sure it does not endanger the anonymity if anonymous reviews are the policy of the journal. If anonymity is the rule of the journal, do not share the manuscript with colleagues unless the Editor has given the green light. Anonymity as a journal policy is rather a religious rule—people are strongly for and against. Conform strictly to the policy defined by the journal asking you to review.

Rule 9: Write Clearly, Succinctly, and in a Neutral Tone, but Be Decisive

A poorly written review is as bad as a poorly written paper (see Rule 3). Try to be sure the Editors and the authors can understand the points you are making. A point-by-point critique is valuable since it is easy to read and to respond to. For each point, indicate how critical it is to your accepting the paper. If English is not your strong point, have someone else read the paper and the review, but without violating other rules, particularly Rule 2. Further, as passionate as you might be about the subject of the paper, do not push your own opinion or hypotheses. Finally, give the Editors a clear answer as to your recommendation for publication. Reviewers frequently do not give a rating even when requested. Provide a rating—fence-sitting prolongs the process unnecessarily.

Rule 10: Make Use of the "Comments to Editors"

Most journals provide the opportunity to send comments to the Editors, which are not seen by the authors. Use this opportunity to provide your opinion or personal perspective of the paper in a few clear sentences. However, be sure those comments are clearly supported by your review—do not leave the Editor guessing with comments like "this really should not be published" if your review does not strongly support that statement. It is also a place where anonymity can be relaxed and reasons for decisions made clearer. For example, your decision may be based on other papers you have reviewed for the journal, which can be indicated in the Editor-only section. It is also a good place to indicate your own shortcomings, biases, etc., with regard to the content of the paper (see Rule 5). This option is used too infrequently and yet can make a great deal of difference to an Editor trying to deal with a split decision. ■

References

1. Bourne PE (2005) Ten simple rules for getting published. PLoS Comput Biol 1 (5): DOI: 10.1371/journal.pcbi.0010057
2. Bourne PE, Chalupa LM (2006) Ten simple rules for getting grants. PLoS Comput Biol 2 (2): DOI: 10.1371/journal.pcbi.0020012

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Editorial

Ten Simple Rules for Selecting a Postdoctoral Position

Philip E. Bourne*, Iddo Friedberg

You are a PhD candidate and your thesis defense is already in sight. You have decided you would like to continue with a postdoctoral position rather than moving into industry as the next step in your career (that decision should be the subject of another "Ten Simple Rules"). Further, you already have ideas for the type of research you wish to pursue and perhaps some ideas for specific projects. Here are ten simple rules to help you make the best decisions on a research project and the laboratory in which to carry it out.

Rule 1: Select a Position that Excites You

If you find the position boring, you will not do your best work—believe us, the salary will not be what motivates you, it will be the science. Discuss the position fully with your proposed mentor, review the literature on the proposed project, and discuss it with others to get a balanced view. Try and evaluate what will be published during the process of your research. Being scooped during a postdoc can be a big setback. Just because the mentor is excited about the project does not mean you that will be six months into it.

Rule 2: Select a Laboratory That Suits Your Work and Lifestyle

If at all possible, visit the laboratory before making a decision. Laboratories vary widely in scope and size. Think about how you like to work—as part of a team, individually, with little supervision, with significant supervision (remembering that this is part of your training where you are supposed to be becoming independent), etc. Talk to other graduate students and postdoctoral fellows in the laboratory and determine the work style of the laboratory. Also, your best work is going to be done when you are happiest with the rest of your life. Does the location of the laboratory and the surrounding environment satisfy your nonwork interests?

Rule 3: Select a Laboratory and a Project That Develop New Skills

Maximizing your versatility increases your marketability. Balance this against the need to ultimately be recognized for a particular set of contributions. Avoid strictly continuing the work you did in graduate school. A postdoctoral position is an extension of your graduate training; maximize your gain in knowledge and experience. Think very carefully before extending your graduate work into a postdoc in the same laboratory where you are now—to some professionals this raises a red flag when they look at your resume. Almost never does it maximize your gain of knowledge and experience, but that can be offset by rapid and important publications.

Rule 4: Have a Backup Plan

Do not be afraid to take risks, although keep in mind that pursuing a risky project does not mean it should be unrealistic: carefully research and plan your project. Even then, the most researched, well-thought-out, and well-planned project may fizzle; research is like that. Then what? Do you have a backup plan? Consider working on at least two projects. One to which you devote most of your time and energy and the second as a fallback. The second project should be more of the "bread and butter" type, guaranteed to generate good (if not exciting) results no matter what happens. This contradicts *Rule 1*, but that is allowed for a backup plan. For as we see in *Rule 5*, you need tangible outcomes.

Rule 5: Choose a Project with Tangible Outcomes That Match Your Career Goals

For a future in academia, the most tangible outcomes are publications, followed by more publications. Does the laboratory you are entering have a track record in producing high-quality publications? Is your future mentor well-respected and recognized by the community? Talk to postdocs who have left the laboratory and find out. If the mentor is young, does s/he have the promise of providing those outcomes? Strive to have at least one quality publication per year.

Rule 6: Negotiate First Authorship before You Start

The average number of authors on a paper has continued to rise over the years: a sign that science continues to become more collaborative. This is good for science, but how does it impact your career prospects? Think of it this way. If you are not the first author on a paper, your contribution is viewed as $1/n$ where n is the number of authors. Journals such as this one try to document each author's contributions; this is a relatively new concept, and few people pay any attention to it. Have an understanding with your mentor on your likelihood of first authorship before you start a project. It is best to tackle this problem early during the interview process and to achieve an

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understanding; this prevents conflicts and disappointments later on. Don't be shy about speaking frankly on this issue. This is particularly important when you are joining an ongoing study.

Rule 7: The Time in a Postdoctoral Fellowship Should Be Finite

Mentors favor postdocs second only to students. Why? Postdocs are second only to students in providing a talented labor pool for the least possible cost. If you are good, your mentor may want you to postdoc for a long period. Three years in any postdoc is probably enough. Three years often corresponds to the length of a grant that pays the postdoctoral fellowship, so the grant may define the duration. Definitely find out about the source and duration of funding before accepting a position. Be very wary about accepting one-year appointments. Be aware that the length of a postdoc will likely be governed by the prevailing job market. When the job market is good, assistant professorships and suitable positions in industry will mean you can transition early to the next stage of your career. Since the job market even a year out is unpredictable, having at least the option of a three-year postdoc fellowship is desirable.

Rule 8: Evaluate the Growth Path

Many independent researchers continue the research they started during their postdoc well into their first years as assistant professors, and they may continue the same line of work in industry, too. When researching the field you are about to enter, consider how much has been done already, how much you can contribute in your postdoc, and whether you could take it with you after your postdoc. This should be discussed with your mentor as part of an ongoing open dialog, since in the future you may be competing against your mentor. A good mentor will understand, as should you, that your horizon is independence—your own future lab, as a group leader, etc.

Rule 9: Strive to Get Your Own Money

The ease of getting a postdoc is correlated with the amount of independent research monies available. When grants are hard to get, so are postdocs. Entering a position with your own financing gives you a level of independence and an important extra line on your resume. This requires forward thinking, since most sources of funding come from a joint application with the person who will mentor you as a postdoc. Few graduate students think about applying for postdoctoral fellowships in a timely way. Even if you do not apply for funding early, it remains an attractive option, even after your postdoc has started with a different funding source. Choosing one to two potential mentors and writing a grant at least a year before you will graduate is recommended.

Rule 10: Learn to Recognize Opportunities

New areas of science emerge and become hot very quickly. Getting involved in an area early on has advantages, since you will be more easily recognized. Consider a laboratory and mentor that have a track record in pioneering new areas or at least the promise to do so. ■

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PLoS COMPUTATIONAL BIOLOGY

Editorial

Ten Simple Rules for a Successful Collaboration

Quentin Vicens, Philip E. Bourne*

Scientific research has always been a collaborative undertaking, and this is particularly true today. For example, between 1981 and 2001, the average number of coauthors on a paper for the Proceedings of the National Academy of Sciences U S A rose from 3.9 to 8.4 [1]. Why the increase? Biology has always been considered the study of living systems; many of us now think of it as the study of complex systems. Understanding this complexity requires experts in many different domains. In short, these days success in being a biologist depends more on one's ability to collaborate than ever before. The Medical Research Centers in the United Kingdom figured this out long ago, and the new Janelia Farm research campus of the Howard Hughes Medical Institute in the United States has got the idea, as it strongly promotes intra- and inter-institutional collaborations [2].

Given that collaboration is crucial, how do you go about picking the right collaborators, and how can you best make the collaboration work? Here are ten simple rules based on our experience that we hope will help. Additional suggestions can be found in the references [3,4]. Above all, keep in mind that these rules are for both you and your collaborators. Always remember to treat your collaborators as you would want to be treated yourself—empathy is key.

Rule 1: Do Not Be Lured into Just Any Collaboration

Learn to say no, even if it is to an attractive grant that would involve significant amounts of money and/or if it is a collaboration with someone more established and well-known. It is easier to say no at the beginning—the longer an ill-fated collaboration drags on, the harder it is to sever, and the worse it will be in the end. Enter a collaboration because of a shared passion for the science, not just because you think getting that grant or working with this person would look good on your curriculum vitae. Attending meetings is a perfect opportunity to interact with people who have shared interests [5]. Take time to consider all aspects of the potential collaboration. Ask yourself, will this collaboration really make a difference in my research? Does this grant constitute a valid motivation to seek out that collaboration? Do I have the expertise required to tackle the proposed tasks? What priority will this teamwork have for me? Will I be able to deliver on time? If the answer is no for even one of these questions, the collaboration could be ill-fated.

Enter a collaboration because of a shared passion for the science . . .

Rule 2: Decide at the Beginning Who Will Work on What Tasks

Carefully establishing the purpose of the collaboration and delegating responsibilities is priceless. Often the collaboration will be defined by a grant. In that case, revisit the specific aims regularly and be sure the respective responsibilities are being met. Otherwise, consider writing a memo of understanding, or, if that is too formal, at least an e-mail about who is responsible for what. Given the delegation of tasks, discuss expectations for authorship early in the work. Having said that, leave room for evolution over the course of the collaboration. New ideas will arise. Have a mutual understanding up-front such that these ideas can be embraced as an extension of the original collaboration. Discuss adjustments to the timelines and the order of authors on the final published paper, accordingly. In any case, be comfortable with the anticipated credit you will get from the work. The history of science is littered with stories of unacknowledged contributions.

Rule 3: Stick to Your Tasks

Scientific research is such that every answered question begs a number of new questions to be answered. Do not digress into these new questions without first discussing them with your collaborators. Do not change your initial plans without discussing the change with your collaborators. Thinking they will be pleased with your new approach or innovation is often misplaced and can lead to conflict.

Rule 4: Be Open and Honest

Share data, protocols, materials, etc., and make papers accessible prior to publication. Remain available. A trusting relationship is important for the collaborative understanding of the problem being tackled and for the subsequent joint thinking throughout the evolution of the collaboration.

Rule 5: Feel Respect, Get Respect

If you do not have respect for the scientific work of your collaborators, you should definitely not be collaborating. Respect here especially means playing by Rules 2–4. If you do not respect your collaborators, it will show. Likewise, if they don't respect you. Look for the signs. The signs will depend on the personality of your

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collaborators and range from being aggressive to being passive–aggressive. For example, getting your tasks done in a timely manner should be your priority. There is nothing more frustrating for your collaborators than to have to throttle their progress while they are waiting for you to send them your data. Showing respect would be to inform your collaborator when you cannot make a previously agreed-upon deadline, so that other arrangements can be made.

Rule 6: Communicate, Communicate, and Communicate

Consistent communication with your collaborators is the best way to make sure the partnership is going in the planned direction. Nothing new here, it is the same as for friendship and marriage. Communication is always better face-to-face if possible, for example by traveling to meet your collaborators, or by scheduling discussion related to your collaborations during conferences that the people involved will attend. Synchronous communication by telephone or video teleconferencing is preferred over asynchronous collaboration by e-mail (data could be exchanged by e-mail prior to a call so that everyone can refer to the data while talking).

Rule 7: Protect Yourself from a Collaboration That Turns Sour

The excitement of a new collaboration can often quickly dissipate as the first hurdles to any new project appear. The direct consequence can be a progressive lack of interest and focus to get the job done. To avoid the subsequent frustrations and resentment that could even impact your work in general, give three chances to your collaborators to get back on track. After all, your collaborators could just be having a difficult time for reasons outside of their control and unanticipated at the time the collaboration started. After three chances, if it feels like the collaboration cannot be saved, move on. At that point try to minimize the role of your collaborators in your work: think carefully about the most basic help you need from them and get it while you can (e.g., when having a phone call or a meeting in person). You may still need to deal with the co-authorship, but hopefully for one paper only!

Rule 8: Always Acknowledge and Cite Your Collaborators

This applies as soon as you mention preliminary results. Be clear on who undertook what aspect of the work being reported. Additionally, citing your collaborators can reveal your dynamism and your skills at developing prosperous professional relationships. This skill will be valued by your peers throughout your career.

Rule 9: Seek Advice from Experienced Scientists

Even though you may not encounter severe difficulties that would result in the failure of the partnership, each collaboration will come with a particular set of challenges. To overcome these obstacles, interact with colleagues not involved in the work, such as your former advisors or professors in your department who have probably been through all kinds of collaborations. They will offer insightful advice that will help you move beyond the current crisis. Remember, however, that a crisis can occasionally lead to a breakthrough. Do not, therefore, give up on the collaboration too easily.

Rule 10: If Your Collaboration Satisfies You, Keep It Going

Ever wondered why a pair of authors has published so many papers together? Well, it is like any good recipe: when you find one that works, you cook it again and again. Successful teamwork will tend to keep flourishing—the first paper will stimulate deeper and/or broader studies that will in turn lead to more papers. As you get to know your collaborators, you begin to understand work habits, strengths but also weaknesses, as well as respective areas of knowledge. Accepting these things and working together can make the work advance rapidly, but do not hurry: it takes time and effort from both sides to get to this point.

Collaborations often come unexpectedly, just like this one. One of us (PEB) as Editor-in-Chief was approached not just with the idea for these Ten Rules, but with a draft set of rules that needed only minor reworking. As you can see, we have obeyed Rule 8. ■

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References

1. Borner K, Maru JT, Goldstone RL (2004) The simultaneous evolution of author and paper networks. Proc Natl Acad Sci U S A 101: 5266–5273.
2. Rubin GM (2006) Janelia Farm: An experiment in scientific culture. Cell 125: 209–212.
3. Smalheiser NR, Perkins GA, Jones S (2005) Guidelines for negotiating scientific collaboration. PLoS Biol 3: e217.
4. Burroughs Wellcome Fund, Howard Hughes Medical Institute (2006) Making the right move. A practical guide to scientific management for postdocs and new faculty. Chevy Chase. Available: http://www.hhmi.org/labmanagement. Accessed 21 February 2007.
5. Aiken JW (2006) What's the value of conferences? Scientist 20: 54–56.

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PLoS COMPUTATIONAL BIOLOGY

Editorial

Ten Simple Rules for Making Good Oral Presentations

Philip E. Bourne

Continuing our "Ten Simple Rules" series [1–5], we consider here what it takes to make a good oral presentation. While the rules apply broadly across disciplines, they are certainly important from the perspective of this readership. Clear and logical delivery of your ideas and scientific results is an important component of a successful scientific career. Presentations encourage broader dissemination of your work and highlight work that may not receive attention in written form.

Rule 1: Talk to the Audience

We do not mean face the audience, although gaining eye contact with as many people as possible when you present is important since it adds a level of intimacy and comfort to the presentation. We mean prepare presentations that address the target audience. Be sure you know who your audience is—what are their backgrounds and knowledge level of the material you are presenting and what they are hoping to get out of the presentation? Off-topic presentations are usually boring and will not endear you to the audience. Deliver what the audience wants to hear.

Rule 2: Less is More

A common mistake of inexperienced presenters is to try to say too much. They feel the need to prove themselves by proving to the audience that they know a lot. As a result, the main message is often lost, and valuable question time is usually curtailed. Your knowledge of the subject is best expressed through a clear and concise presentation that is provocative and leads to a dialog during the question-and-answer session when the audience becomes active participants. At that point, your knowledge of the material will likely become clear. If you do not get any questions, then you have not been following the other rules. Most likely, your presentation was either incomprehensible or trite. A side effect of too much material is that you talk too quickly, another ingredient of a lost message.

Rule 3: Only Talk When You Have Something to Say

Do not be overzealous about what you think you will have available to present when the time comes. Research never goes as fast as you would like. Remember the audience's time is precious and should not be abused by presentation of uninteresting preliminary material.

Rule 4: Make the Take-Home Message Persistent

A good rule of thumb would seem to be that if you ask a member of the audience a week later about your presentation, they should be able to remember three points. If these are the key points you were trying to get across, you have done a good job. If they can remember any three points, but not the key points, then your emphasis was wrong. It is obvious what it means if they cannot recall three points!

Rule 5: Be Logical

Think of the presentation as a story. There is a logical flow—a clear beginning, middle, and an end. You set the stage (beginning), you tell the story (middle), and you have a big finish (the end) where the take-home message is clearly understood.

Rule 6: Treat the Floor as a Stage

Presentations should be entertaining, but do not overdo it and do know your limits. If you are not humorous by nature, do not try and be humorous. If you are not good at telling anecdotes, do not try and tell anecdotes, and so on. A good entertainer will captivate the audience and increase the likelihood of obeying Rule 4.

Rule 7: Practice and Time Your Presentation

This is particularly important for inexperienced presenters. Even more important, when you give the presentation, stick to what you practice. It is common to deviate, and even worse to start presenting material that you know less about than the audience does. The more you practice, the less likely you will be to go off on tangents. Visual cues help here. The more presentations you give, the better you are going to get. In a scientific environment, take every opportunity to do journal club and become a teaching assistant if it allows you to present. An important talk should not be given for the first time to an audience of peers. You should have delivered it to your research collaborators who will be kinder and gentler but still point out obvious discrepancies. Laboratory group meetings are a fine forum for this.

Rule 8: Use Visuals Sparingly but Effectively

Presenters have different styles of presenting. Some can captivate the audience with no visuals (rare); others require visual cues and in addition, depending on the material, may not be able to present a particular topic well without the appropriate visuals such as graphs and charts. Preparing good visual materials will be the subject of a further Ten Simple Rules. Rule 7 will

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help you to define the right number of visuals for a particular presentation. A useful rule of thumb for us is if you have more than one visual for each minute you are talking, you have too many and you will run over time. Obviously some visuals are quick, others take time to get the message across; again Rule 7 will help. Avoid reading the visual unless you wish to emphasize the point explicitly, the audience can read, too! The visual should support what you are saying either for emphasis or with data to prove the verbal point. Finally, do not overload the visual. Make the points few and clear.

Rule 9: Review Audio and/or Video of Your Presentations

There is nothing more effective than listening to, or listening to and viewing, a presentation you have made. Violations of the other rules will become obvious. Seeing what is wrong is easy, correcting it the next time around is not. You will likely need to break bad habits that lead to the violation of the other rules. Work hard on breaking bad habits; it is important.

Rule 10: Provide Appropriate Acknowledgments

People love to be acknowledged for their contributions. Having many gratuitous acknowledgements degrades the people who actually contributed. If you defy Rule 7, then you will not be able to acknowledge people and organizations appropriately, as you will run out of time. It is often appropriate to acknowledge people at the beginning or at the point of their contribution so that their contributions are very clear.

As a final word of caution, we have found that even in following the Ten Simple Rules (or perhaps thinking we are following them), the outcome of a presentation is not always guaranteed. Audience–presenter dynamics are hard to predict even though the metric of depth and intensity of questions and off-line followup provide excellent indicators. Sometimes you are sure a presentation will go well, and afterward you feel it did not go well. Other times you dread what the audience will think, and you come away pleased as punch. Such is life. As always, we welcome your comments on these Ten Simple Rules by Reader Response. ■

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References

1. Bourne PE (2005) Ten simple rules for getting published. PLoS Comp Biol 1: e57.
2. Bourne PE, Chalupa LM (2006) Ten simple rules for getting grants. PLoS Comp Biol 2: e12.
3. Bourne PE, Korngreen A (2006) Ten simple rules for reviewers. PLoS Comp Biol 2: e110.
4. Bourne PE, Friedberg I (2006) Ten simple rules for selecting a postdoctoral fellowship. PLoS Comp Biol 2: e121.
5. Vicens Q, Bourne PE (2007) Ten simple rules for a successful collaboration. PLoS Comp Biol 3: e44.

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Editorial

Ten Simple Rules for a Good Poster Presentation

Thomas C. Erren*, Philip E. Bourne

Posters are a key component of communicating your science and an important element in a successful scientific career. Posters, while delivering the same high-quality science, offer a different medium from either oral presentations [1] or published papers [2], and should be treated accordingly. Posters should be considered a snapshot of your work intended to engage colleagues in a dialog about the work, or, if you are not present, to be a summary that will encourage the reader to want to learn more. Many a lifelong collaboration [3] has begun in front of a poster board. Here are ten simple rules for maximizing the return on the time-consuming process of preparing and presenting an effective poster.

Rule 1: Define the Purpose

The purpose will vary depending on the status and nature of the work being presented, as well as the intent. Some posters are designed to be used again and again; for example, those making conference attendees aware of a shared resource. Others will likely be used once at a conference and then be relegated to the wall in the laboratory. Before you start preparing the poster, ask yourself the following questions: What do you want the person passing by your poster to do? Engage in a discussion about the content? Learn enough to go off and want to try something for themselves? Want to collaborate? All the above, or none of the above but something else? Style your poster accordingly.

Rule 2: Sell Your Work in Ten Seconds

Some conferences will present hundreds of posters; you will need to fight for attention. The first impressions of your poster, and to a lesser extent what you might say when standing in front of it, are crucial. It is analogous to being in an elevator and having a few seconds to peak someone's interest before they get off. The sad truth is that you have to sell your work. One approach is to pose your work as addressing a decisive question, which you then address as best you can. Once you have posed the question, which may well also be the motivation for the study, the focus of your poster should be on addressing that question in a clear and concise way.

Rule 3: The Title Is Important

The title is a good way to sell your work. It may be the only thing the conference attendee sees before they reach your poster. The title should make them want to come and visit. The title might pose a decisive question, define the scope of the study, or hint at a new finding. Above all, the title should be short and comprehensible to a broad audience. The title is your equivalent of a newspaper headline—short, sharp, and compelling.

Rule 4: Poster Acceptance Means Nothing

Do not take the acceptance of a poster as an endorsement of your work. Conferences need attendees to be financially viable. Many attendees who are there on grants cannot justify attending a conference unless they present. There are a small number of speaking slots compared with attendees. How to solve the dilemma? Enter posters; this way everyone can present. In other words, your poster has not been endorsed, just accepted. To get endorsement from your peers, do good science and present it well on the poster.

Rule 5: Many of the Rules for Writing a Good Paper Apply to Posters, Too

Identify your audience and provide the appropriate scope and depth of content. If the conference includes nonspecialists, cater to them. Just as the abstract of a paper needs to be a succinct summary of the motivation, hypothesis to be tested, major results, and conclusions, so does your poster.

Rule 6: Good Posters Have Unique Features Not Pertinent to Papers

The amount of material presented in a paper far outweighs what is presented on a poster. A poster requires you to distill the work, yet not lose the message or the logical flow. Posters need to be viewed from a distance, but can take advantage of your presence. Posters can be used as a distribution medium for copies of associated papers, supplementary information, and other handouts. Posters allow you to be more speculative. Often only the titles or at most the abstracts of posters can be considered published; that is, widely distributed. Mostly, they may never be seen again. There is the opportunity to say more than you would in the traditional literature, which for all intents and purposes will be part of the immutable record. Take advantage of these unique features.

Rule 7: Layout and Format Are Critical

Pop musician Keith Richards put the matter well in an interview with *Der Spiegel* [4]: "If you are a painter, then the most important thing is the bare canvas. A good painter will never cover all the space but will always leave some

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blank. My canvas is silence." Your canvas as poster presenter is also white space. Guide the passerby's eyes from one succinct frame to another in a logical fashion from beginning to end. Unlike the literature, which is linear by virtue of one page following another, the reader of a poster is free to wander over the pages as if they are tacked to the poster board in a random order. Guide the reader with arrows, numbering, or whatever else makes sense in getting them to move from one logical step to another. Try to do this guiding in an unusual and eye-catching way. Look for appropriate layouts in the posters of others and adopt some of their approaches. Finally, never use less than a size 24 point font, and make sure the main points can be read at eye level.

Rule 8: Content Is Important, but Keep It Concise

Everything on the poster should help convey the message. The text must conform to the norms of sound scientific reporting: clarity, precision of expression, and economy of words. The latter is particularly important for posters because of their inherent space limitations. Use of first-rate pictorial material to illustrate a poster can sometimes transform what would otherwise be a bewildering mass of complex data into a coherent and convincing story. One carefully produced chart or graph often says more than hundreds of words. Use graphics for "clear portrayal of complexity" [5], not to impress (and possibly bewilder) viewers with complex artistry. Allow a figure to be viewed in both a superficial and a detailed way. For example, a large table might have bold swaths of color indicating relative contributions from different categories, and the smaller text in the table would provide gritty details for those who want them. Likewise, a graph could provide a bold trend line (with its interpretation clearly and concisely stated), and also have many detailed points with error bars. Have a clear and obvious set of conclusions—after the abstract, this is where the passerby's eyes will wander. Only then will they go to the results, followed by the methods.

Rule 9: Posters Should Have Your Personality

A poster is a different medium from a paper, which is conventionally dry and impersonal. Think of your poster as an extension of your personality. Use it to draw the passerby to take a closer look or to want to talk to you. Scientific collaboration often starts for reasons other than the shared scientific interest, such as a personal interest. A photo of you on the poster not only helps someone find you at the conference when you are not at the poster, it can also be used to illustrate a hobby or an interest that can open a conversation.

Rule 10: The Impact of a Poster Happens Both During and After the Poster Session

When the considerable effort of making a poster is done, do not blow it on presentation day by failing to have the poster achieve maximum impact. This requires the right presenter–audience interaction. Work to get a crowd by being engaging; one engaged viewer will attract others. Don't badger people, let them read. Be ready with Rule 2. Work all the audience at once, do not leave visitors waiting for your attention. Make eye contact with every visitor.

Make it easy for a conference attendee to contact you afterward. Have copies of relevant papers on hand as well as copies of the poster on standard-sized paper. For work that is more mature, have the poster online and make the URL available as a handout. Have your e-mail and other demographics clearly displayed. Follow up with people who come to the poster by having a signup sheet.

The visitor is more likely to remember you than the content of your poster. Make yourself easy to remember. As the host of the work presented on the poster, be attentive, open, and curious, and self-confident but never arrogant and aggressive. Leave the visitors space and time—they can "travel" through your poster at their own discretion and pace. If a visitor asks a question, talk simply and openly about the work. This is likely your opportunity to get feedback on the work before it goes to publication. Better to be tripped up in front of your poster than by a reviewer of the manuscript.

Good posters and their presentations can improve your reputation, both within and outside your working group and institution, and may also contribute to a certain scientific freedom. Poster prizes count when peers look at your resume.

These ten rules will hopefully help you in preparing better posters. For a more humorous view on what not to do in preparing a poster, see [6], and for further information, including the opportunity to practice your German, see [7]. ■

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References

1. Bourne PE (2007) Ten simple rules for making good oral presentations. PLoS Comput Biol 3: e77. doi:10.1371/journal.pcbi.0030077
2. Bourne PE (2005) Ten simple rules for getting published. PLoS Comput Biol 1: e57. doi:10.1371/journal.pcbi.0010057
3. Vicens Q, Bourne PE (2007) Ten simple rules for a successful collaboration. PLoS Comput Biol 3: e44. doi:10.1371/journal.pcbi.0030044
4. (1998) Interview with Keith Richards. Meine Leinwand ist die Stille. Der Spiegel 45: 167–170.
5. Tufte ER (2001) The visual display of quantitative information. Cheshire (Connecticut): Graphics Press. p. 191.
6. Wolcott TG (1997) Mortal sins in poster presentations or how to give the poster no one remembers. Newsletter Soc Integr Compar Biol Fall: 10–11. Available: http://www.sicb.org/newsletters/fa97nl/sicb/poster.html. Accessed 23 April 2007.
7. Erren TC (2006). Schau mich an! Ein Leitfaden zur Erstellung und Präsentation von Postern in der Medizin und den Naturwissenschaften. München/Wien/New York: W. Zuckschwerdt Verlag.