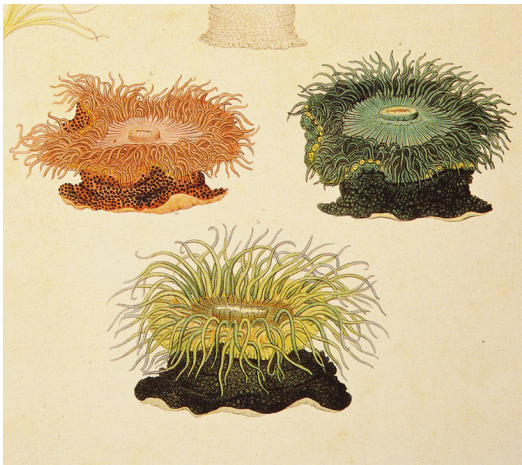

# ECO 101

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## Finding the "Pitch" in Ecological Writing

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*This paper is the product of a seminar led by JC Cahill in response to a request by many graduate students and post-docs in our department to teach effective writing strategies. Rather than go over the mechanics of writing, JC introduced the concept of "pitch" and its importance in scientific writing. Many students requested a text version of his presentation, which was ultimately transformed into the current document. In this paper, we define and present "pitch," and layout guidelines for bringing pitch to the two most common types of scientific writing, papers and grant applications. We suggest that once students have learned the mechanics of writing, the single most important thing students can do to write effectively is to find a clear pitch.*

A decade ago, the "top" ecological journals tended to be those that focused on integrative papers, allowed the researcher to develop arguments, and commonly involved multiple studies in single papers. Many established researchers looked derisively at those scientists who published LPUs "Least Publishable Units," rather than telling a more complete story. Those scientists who decried the LPU approach also sat on the editorial boards, grants panels, and search committees, and today, most of our top-ranked journals increasingly focus on publishing short papers. Whether one likes it or not, we live in the age of the LPU and the call is out for short, focused papers. One of the best ways for students to increase the likelihood of getting their papers published in top journals and having their grant applications funded is to learn to write with "pitch."

Writing with pitch requires a unique set of skills, the most important of which is having a story and not deviating from the narrative. This goes against the instinct of the scientist, as we typically want to

explain every implication, caveat, and limitation of what we do. These tendencies will result in much agony. Here, we describe some alternatives. None of what we discuss below, however, will help unless a good research question has been asked, a solid study design developed, and data properly collected, analyzed, and interpreted. With students in mind, we define pitch, and outline tips for finding pitch for the two most common types of scientific writing, papers and grant applications.

### What is pitch?

*"to attempt to promote or sell, often in a high-pressure manner.* (American Heritage Dictionary 2000)

*"promotion by means of an argument and demonstration."* (WordNet, Princeton University 2010, *available online*)[1]

When one writes a great novel, it is fine (perhaps even preferred) to have the readers connect the dots in the story; to have them use some brainpower to understand how the pieces of the book connect to each other and to larger issues. This form of writing will typically fail in science at one of two stages: (1) peer review, and, if that is somehow passed, (2) use by colleagues. Professors are busy. Really busy. Professors also tend to be editors, reviewers, and researchers—the people who will judge written work at every stage, both for suitability of publication or funding, and less explicitly, for whether it has any impact in the field. When it comes to developing pitch, there are two things that are likely going to reduce success:

1. **A high-pressured "sell" won't work** in scientific writing, at least not for peer-reviewed writing. Scientists tend to be independent, strong-willed people. We don't like to be told what to believe. Instead, we like to be shown what is likely true.
2. **A paper without pitch won't work**, as we don't have time to figure out what you meant to say, and why it is important. If you don't lay these things out right in front of us, we are not likely to give your paper or grant application a positive review, nor are we likely to use your work as we prepare our own manuscripts.

Thus the right pitch in ecology has to navigate these two constraints rising like mountains of rejection; too much of a "sell" and reviewers get grumpy; too little, and reviewers get grumpy. Grumpy reviewers result in rejection. The middle ground, what you should be aiming for, we will call the "valley of happiness." So what does this valley look like? In that world, single papers will typically have a single story. The research objectives are an obvious extension of the introduction. The research methods are succinct, and their connection to the research objectives are clear. The results are short and directly answer the research questions. The most important information comes first. The discussion is brief and focused, with clear topic sentences. It will read as a coherent whole. A key aspect of a well-written paper with a solid pitch is that someone reading ANY section of the paper should have a clear understanding of the main objectives of the paper, even without reading any other parts of the paper. Or put another way, your pitch is your research question, and this should be returned to in every part of the paper. Importantly, the wording of your research questions in your paper rarely would be the wording you used in your original research proposal. You must modify your pitch as your project develops, and as your interpretation changes.

1 ‹http://wordnet.princeton.edu›

Below, we provide some suggestions on how to develop your pitch in scientific writing, the first of which is a need to understand who your audience is, and to tailor your pitch to their needs and expectations.

### Different audiences and different goals

The most common types of scientific writing are (1) peer-reviewed papers, and (2) grant applications. Each has a different goal, and different audiences. We do not write these documents for ourselves, instead we write them for others. Once you realize this, it becomes obvious that you need to write according to what other people want to see and need to know. An effective pitch is tailored to your audience.

When we write a paper, we hope the ultimate audience will be other scientists, in fields related to our own. However, to reach that audience we first have to satisfy an audience made up of specialist peer reviewers and editors. Reviewers are typically specialists in your field who will focus most on the details of your study. Prior to reading your manuscript, some reviewers might think positively of your prior work, some will think negatively, and others won't have any idea who you are. This doesn't mean they are unable to fairly review your manuscript, but the peer review is a socio-political process, and you need to be aware of this. Reviewers will want to see that you both understand what research has already been done in your field, and that your research will truly make advances. It is critical that you develop the context for your research questions from a broad literature, and not focus exclusively on work done in your lab. Similarly, your impact needs to be on the field as a whole, not just your lab.

The handling editor is a secondary audience with some unique concerns. They tend to be strongly influenced by the quality of the reviews, but they will also judge a submitted manuscript based upon their own read of the paper. Believe it or not, split decisions among reviews are the exception, not the rule. Bad papers are obvious, as are outstanding papers. As a result, it is very easy for the handling editor to reject or accept these papers without needing to fret too much about the decision. When split decisions do occur, the handling editor judges the reviews and weighs their own feelings about the potential impacts of the work on the field as a whole. Here, pitch is critical. The handling editor is generally looking for a reason to reject, not accept. If the strengths of your work are hidden, then you had better hope that you received two outstanding reviews; otherwise don't hold your breath. Historically, handling editors used the "reject and resubmit" option when they and the reviewers felt that the underlying data were strong, but poorly presented (e.g., bad pitch) and/or incorrectly analyzed and interpreted. Some journals are encouraging handling editors to use this option less frequently and instead to reject papers outright. This will put increased emphasis on getting one's pitch right in the first submission.

Many journals frequently reject papers without review, and in such cases, the Editor-in-Chief may be an important audience. Typically, they will focus on the more general aspects of the paper presented in the abstract and cover letter. Satisfying the Editor-in-Chief requires stating your pitch in clear, general terms and making sure that all parts of your writing relate to your central ideas.

The goal of a grant application is simple: to get money for future research. Grant applications need to be very well written (sloppy writing suggests careless research). Your pitch will lead the reader to a specific conclusion, one for which there is no answer, and thus money is needed to solve it. There

are no shortcuts here; you must be very knowledgeable about your field, understand how the pieces fit together, and identify real holes in understanding. The audience for a grant application depends upon the specific grant, but will generally consist of specialists in your field (reviewers) and generalists in ecology (some panel members). However, many grant panels also include stakeholder representatives and/or administrators**.** Within a single grant you will need several different pitches, each tailored to these different audiences.

Specialists are reviewers with objectives similar to those described for papers. They focus on the quality and originality of the science. Panel members are usually scientists who may not be from your specific field. This group will focus most on the general objectives of your study, and the quality of the reviews, so obviously having strong reviews will help you. Doing your research on likely panel members makes sense, as there will be some opportunities for you to use examples from the panel member's areas of expertise. You do this, not to pander, but to frame your objectives partly in a context that they are already familiar with. One must make it easy for reviewers to understand why your work is important. Stakeholders are a group of readers who will focus most on *their own objectives*, and whether yours match theirs. You need to be certain you are using the language they are used to, and that you link your ideas to the specific objectives they list in the call for proposals. You are unlikely to convince them to fund great ideas unless you show very explicitly in your pitch that your work meets their goals. This form of writing needs to be plain and succinct. Pay attention to the front and back ends of your grant application —the summary and conclusion. These sections are typically targeted to stakeholders.

Whether you are writing a paper or a grant application, you need to convince all of your reviewers of the great merit in your elegant ideas in a single document of limited length. How? First, have elegant ideas. Second, write well. Third, have a sense of what your pitch is, and how it will interest the reviewers (and thus likely influence other scientists too). Aside from this, you need also to pay attention to how you reference other researchers. Researchers have egos, and they are not usually small. If you work in a relatively small field, you can likely identify a specific person (or laboratory) that will provide a review, and you would be crazy not to include their work in the development of your story. If you need to critique their work, cast that critique in a way that highlights the positives of their contributions, even when you disagree with other aspects of their work. A pitch should not antagonize your reviewers, nor should it be biased in presentation of material. Be sure to be very balanced in your writing, because you won't know who all of your reviewers are. You want to be certain not to unintentionally snub one faction of researchers through omission and/or sloppy writing that conveys critique when you don't intend it. This does not mean you need to cite everyone; instead, you must show balance.

### Writing with "pitch"

Trying to add pitch at the end of constructing a document will be a frustrating experience for you, your co-authors, and your supervisor. The key is to construct your document in a way that lets you integrate your pitch into every section from the beginning. Here we focus on developing pitch for papers (see Table 1 for guidelines on specific sections). There are at least two common approaches to constructing a paper. We call the first "Intelligent Design." This is the traditional approach of working from front to back that most students initially use, as this is what is typically taught in school. In conversations with colleagues, this approach appears to be used relatively rarely by scientists. Nonetheless, here is the idea:

First, make a clear outline of the story from front to back. This outline forms the skeleton of your paper. The backbone of this skeleton is your well-crafted research question, and it connects to every other part of the skeleton. Next, add guts and muscle. These are the essential references that the intended audience needs to understand your research question; the methods needed to answer that question; the data and figures needed to answer the question; and the conclusions that immediately emerge from the answers. It is absolutely essential that every single thing you add be directly connected to the skeleton. Avoid constructing any vestigial organs, tumors, or unsightly growths that will need to be excised. Regularly ask yourself whether your creature could still live if you removed certain bits and pieces. If the answer is yes, remove them. Remember, the goal of the paper is NOT to tell the audience everything you know. Instead, it is to get your paper published and have it be cited. So, just because you spent many hours of hard labor collecting certain data does not justify their inclusion in this paper. Also remember that you are not trying to create the most attractive creature on the planet—just one that is functional enough to get published and cited. Perfectionism reduces research productivity (Sherry et al. 2010), and any time you spend on the bells and whistles (e.g., wonderfully elegant writing) is time that is neither needed to meet your goals, nor time you can spend on your next paper or grant application.

A second approach to writing papers is called "writing backwards" (Magnusson 1996). Modifications of this approach appear to be the most commonly used, at least among our colleagues. According to Magnusson (1996), writing backwards involves the following steps: (1) Write conclusions first (succinctly). (2) Write only the results necessary for those conclusions. (3) Write only the needed methods. (4) Write the discussion as it relates to results. And (5) write the introduction, the minimum needed to present the questions. The advantage of this approach is that it puts the emphasis on the emergent findings that you have, and these are often different from the exact goals of the study you intended to conduct when you started your research project. Good pitch focuses on what you have, not what you intended. We demonstrate two example of writing with pitch in mind in Box 1.

As scientists we disseminate our findings through published papers with the goals of being cited, influencing policy, shifting public opinion, or establishing oneself in a field. Importantly, the goal of a paper is NOT to produce the "best" written paper possible. Instead you should aim for a paper that is written *well enough* for your target journal. Unlike grants, we typically have choices about the journals to which we choose to submit a paper. The choice has importance, and affects our ability to achieve our short-term goals, as well as the potential impact of a paper on longer-term career development. It is important to recognize that the choice of venue influences the necessary pitch and the relative importance of your cover letter. In brief, the broader the audience of the journal (e.g., *Science* vs. *American Fern Journal*), the more general your pitch needs to be. The quality of the science needs to be strong in all cases, but you need to be able to relate your work to increasing numbers of nonspecialists as you move from field-specific to broader-impact journals. It is critical that you structure your entire manuscript accordingly; know your audience and write for them.

### Using your supervisor effectively

Working on a paper or grant application with your supervisor can be a (mutually) frustrating experience. Learning how to work effectively with co-authors is an important part of scientific writing. You can help to minimize frustrating your supervisor by working with them *as needed*, rather than *as*

*desired*. In other words, go to them when you run into a problem that you can't solve for yourself. If you are going to be a successful scientist, you need to learn to work independently, so don't turn to your supervisor because they would do something faster. Also, do not waste your supervisor's time with first drafts, poorly constructed verbiage, or manuscripts with 20 figures and no focus. When it comes to receiving feedback on your manuscript, understanding why your supervisor does certain things can help to limit your frustration. For example, try not to be offended when your supervisor edits part of your paper, and sends it back without reading the rest. As described above, we typically write in a logical sequence, and if one section needs to be completely gutted, time spent on any other section will be time wasted. Also, do not be surprised when supervisors contradict themselves in subsequent drafts. Typically they do this because as the story changes, so too do the needed bits. This is no different from you cutting and repasting. It is part of the writing process. Of course, other times they do it just because it's fun.

## Final advice

You write in the academic world of today, not that of the last century. As such, you will be expected to produce more, shorter, papers than previous generations of ecologists. Staying focused on your pitch will help make these papers better, and easier to write. Remember your goals. At some point, you need to submit your paper. Your goal is not perfection, it is simply for your paper to be good enough. Learn to know where that bar is. Similarly, grant applications have deadlines. Writing a clear, cogent argument as to why your research deserves funding demands pitch. Make pitch your path through all the rubble.

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Table 1. Specific advice for sections of a scientific paper

| | |
|---|---|
| Title | • Don't be overly cute, vague, boring, or long.<br>• Do be precise and accurate. Your title should relate to your main finding. |
| Abstract | • Do not start with a throwaway line, "XXX has been studied for decades; XXX is an indicator of climate change; XXX is important." Instead, start with the real issue.<br>• Do not be vague in your results. Either say it or leave it out of the abstract, and don't allude to something hidden in the text (e.g., XXX will be discussed).<br>• Do not end with a throwaway line, "these results have significant implications of our understanding of XXX; more research is needed." |
| Introduction | • If a point isn't directly needed to set up the research questions, cut it.<br>• Introductions should not be long.<br>• End with a very clear set of specific research questions. Take a long time to really think about how these are worded and what order you want to present them in. |
| Methods | • Relate everything you talk about to the research questions described above.<br>• Do not swap the order, such that if you list questions 1, 2, 3 in the introduction, do not discuss the methods as 3, 1, 2.<br>• When you discuss statistical methods, be sure to relate each test to a specific research objective. If the test is complicated, let the reader know what type of statistical result would indicate what type of answer to your question. |

| | |
|---|---|
| Results | • For nearly every paper, this should be your shortest section. For a regular, ~20 page paper, the results of a tightly written paper with a strong story should be about 1 page (excluding tables/figures).<br><br>• Use fewer figures and tables than you think you need. Put the extras online. The problem with figures is that simple ones are more briefly stated with text, while complex ones take a long time to understand. The latter is fine if, and only if, they are directly related to your main research questions. If tables or figures are simply supportive, then putting them in the main paper will greatly subtract from your overall pitch.<br><br>• When discussing statistical results, focus on the answer to your research questions, not test statistics, *P* values, or AIC values. These are tools for interpretation; they are not meaningful in and of themselves. They are to be used to support your story.<br><br>• Answer your research questions in the same order you presented them. |
| Discussion | • Discuss your research questions in the same order you originally presented them.<br><br>• When interpreting, it is essential that you come back to the same ideas you laid out in your introduction, but now indicate how your results alter our understanding. If some ideas in your introduction don't get referred to in the discussion, they probably didn't belong in your introduction.<br><br>• You should extrapolate from your results one step, but no more than that. For example, if you found X, you can suggest Y. But you cannot say that since X is true, Y might be too, and therefore Z happens. |

Box 1: Examples of how to modify text to incorporate pitch.

| Before | |
|---|---|
| To understand *Mimulosa pudica's* strategy for minimizing lost opportunity cost, we measured the length of time it took the pinnules to reopen given a particular stimulation, under various amounts of Photosynthetically Active Radiation (PAR).[1] If *M. pudica* has evolved strategies to maximize fitness, then the relationship between hiding (anti-herbivore behaviour) and optimal foraging should be configured in the way most advantageous to the plant.[2] This basic assumption leads to the hypothesis that when light is limited, each unit of time that the leaves are open is more photosynthetically valuable.[3] Therefore, in bright light, the cost of having the leaves closed is less than in dim light. | [1]The opening sentence contains jargon (e.g. lost opportunity cost) and focuses on the specific details of measurements rather than the identifying concept for the research.<br>[2]Wordy.<br>[3]Incomplete sentence and difficult to quickly grasp concept. |

| After | |
|---|---|
| A common finding by behavioural ecologists is that animals will accept a greater risk of predation when energetically stressed than when energy is not limiting.[1] Such behaviours can be found in a variety of animal taxa ranging from sessile barnacles to highly mobile birds.[2] Theory suggests there is a balance between risks and rewards faced by individuals, such that at very low energy levels the costs associated with starvation are greater than the risk of predation.[3] Whether plants exhibit the same behavioural tendency to accept more risk under stressed conditions has not previously been tested.[4] | [1]This opening sentence situates work in a broad context.<br>[2]This sentence points out the widespread nature of specific behaviour, implying that it is important.<br>[3]This sentence identifies expectations based on theory, moving the behaviour from being animal specific to one applied to any organism.<br>[4]The closing sentence identifies the need to do research because there is an obvious gap in our understanding. |

## Before

When herbivory treatments were excluded from the analysis, whole-pot plant biomass was significantly higher in mixtures than in monocultures (Mixture: 0.2051 ± 0.1612 g/pot, Monoculture: 0.1698 ± 0.1659 g/pot; $F1, 248 = 185.311$, $p = 0.008$; pooled density and fertilization) at all density and fertilizer levels (Fig. 1).[1] Growth at high-density also significantly increased whole-pot biomass ($F1, 248 = 15.788$, $p < 0.001$), as did fertilization ($F1, 248 = 71.897$, $p < 0.001$), resulting in a maximum plant biomass in fertilized, high density mixtures (0.3664 ± 0.1554 g).[2] No significant two- or three-way interactions were detected by the model ($0.276 < p < 0.740$). [3]

[1]This sentence is disrupted by statistical reports.

[2]Wordy and vague.

[3]Overall, this section is dominated by statistical reporting with little emphasis on ecology.

## After

In the absence of any herbivores, plant genetic diversity significantly increased whole-pot plant biomass by 17% relative to genetic monocultures (Fig. 1 a,b; Table 1).[1] High plant density and fertilization also increased plant biomass (Fig. 1 a,b; Table 1), such that maximum biomass occurred in high density, fertilized mixtures (Fig. 1 a,b).[2] No significant two- or three-way interactions were observed (Table 1).[3]

[1]This result emphasizes both the underlying ecology and the magnitude of the effect. Statistical results are moved to relevant table.

[2]The wording is simplified.

[3]Observer interpretations are emphasized over model results, and p-values are moved to the relevant table.