A scrutiny of the introduction

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ABSTRACT

The introduction to a technical paper should be an invitation to readers to invest their time reading it. Typically this invitation has three parts (1) the review, (2) the claim, and (3) the agenda. The *claim* is where the author should say why the paper's *agenda* is a worthwhile extension of its historical *review.* Personal pronouns should be used in the claim and anywhere else the author expresses judgement, opinion, or choice.

INTRODUCTION

Throughout the years I have participated in reading committees of more than a hundred doctoral dissertations. Additionally, SEP reports contain about sixty papers a year, and I am nominally in charge of making them presentable. In all this activity I have seen many poor abstracts, and in each case I have spared myself and the author much struggle by referring to the short paper, "A scrutiny of the abstract" by Landes [1966], which is distributed by the SEG to all its aspiring authors. I rarely rewrite authors' abstracts any more—it's usually enough to have them reread Landes' paper and rewrite it themselves. Landes' own abstract is worth quoting:

> "The abstract is of the utmost importance, for it is read by 10 to 500 times more people than hear or read the entire article. It should not be a mere recital of subjects covered. Expressions such as 'is discussed' and 'is described' should *never* be included! The abstract should be a condensation and concentration of the *essential information* in the paper."

Introductions are not easy to write either. I am pleased to report that in recent years I have developed a formula for the introduction. With this paper expounding my formula, I am hoping to reduce the need for one-on-one tutoring.

You might be able to produce a good introduction without following my formula, but if you are having trouble producing an introduction *that pleases other people* and you would like to get the writing over with and get on with your life, then I suggest you use the three parts below. After you have constructed these three parts, put them together, separated by paragraph breaks.

THE BODY OF AN INTRODUCTION

My formula for an introduction is a sequence of three parts. They are (1) the review, (2) the claim, and (3) the agenda.

The review

Pick out about 3-10 papers providing a background to your research and say something about each of them. You could paraphrase a sentence or two from each abstract. The review is not intended to be a *historical* review going back to Newton or Descartes. Try to find a few papers by your office mates, your advisor, your predecessors, or other associates. That way you might find somebody to give you helpful criticism!

Anyone can follow these instructions and make a review that *looks* presentable. Where intelligence and skill are required is in organizing the review so that it leads up to something, namely, to your *claim.*

The claim

The most important part of the introduction is buried in the middle. It is the *claim.* This is where you claim your work is a worthwhile extension of the review you just wrote. If someone says your writing is "unmotivated," they aren't insulting your humanity, it just means they can't find your claim.

Your claim is where you should use the personal pronoun "I" (or "we" if you aren't the sole author). The word "I" tells people where common knowledge runs out and your ideas begin. If you are writing a doctoral dissertation or an article for a refereed journal, then you should be making a new contribution to existing knowledge. Your paper is *not acceptable* without an identifiable claim. A textbook makes no new contribution to existing knowledge, but its introduction also needs a claim—that the book provides something otherwise unavailable.

Whether your ideas are solid as bed rock or speculative as clouds, you need first-person pronouns. Where your ideas are speculative, the pronouns signal a disclaimer. Where your ideas are solid, the pronouns signal that *you* may be credited for them. When your friends see your personal pronouns they will know just where they should offer their questions and suggestions.

You may use personal pronouns elsewhere in your paper, too. Generally, you should use a personal pronoun whenever you are *expressing an opinion* or *exercising*

judgement. Another time to use "I" is whenever there is a simple matter of *choice.* For example, "To test the theory I selected some data," or "To examine the theory I programmed the equations," or "To evaluate the hypothesis I made some synthetic seismograms."

Some language editors of scientific papers also recommend the use of the personal pronoun "I" to avoid the passive voice. For example, these editors will change "Substitution of equation (1) into equation (2) gives..." into "Substituting equation (1) into equation (2) I find..." But the two wordings have different meanings. The first wording implies the substitution is straightforward, whereas the second wording implies the substitution may involve further unspecified mathematical steps.

Good scientific papers contain all manner of statements ranging from ancient axioms and common knowledge to speculations and outright guesses. It is the *writer's* fault if the *reader* cannot distinguish these types of statements. Personal pronouns are good words to help keep the distinctions clear. Other good words for this purpose are "should, could, would, might, may, can, is, does,..." Use them all and pick the best for each purpose.

The agenda

An agenda is found at the end of many introductions. It summarizes what you will show the reader as your paper progresses. Your agenda will be dull if it is merely a recital of the topics you will cover. Your agenda should tell how your paper works to fulfill your claim. In this way your agenda clarifies your claim.

The agenda is not as important as the review and the claim. Keep it short.

Occasionally you will be fortunate enough to be writing about something in which some of your conclusions can be made in simple statements. If so, state them early, right after your agenda. You aren't trying to write a mystery! Many more people will *begin* reading your paper than will *finish* reading it. Motivate them to finish! Unfortunately, many technical papers do not lend themselves to early conclusions.

AFTER THE INTRODUCTION

Of course you want people to read beyond your introduction too. So think carefully about the order of your material and how you say things. (Notice this tiny paragraph is a small abstract of what follows).

Order of material

You could write your paper so that each part builds on earlier parts. Like a geometry book, you could refuse to refer forward. But, rather than write your paper that way, it is wiser to maximize your readership. Since many more people will begin your paper than will plow through all the way to the end, try to state

results before you prove them. Push off complicated derivations and digressions until the end. Complicated mathematical derivations, especially if marginal to your main thesis, should be relegated to appendices.

What is central and what is peripheral?

In your paper you might want to include digressions, possible applications, etc. Be sure to choose language that clarifies what you think is central and what is peripheral.

CONCLUSION

This short article is not a typical technical paper, but you might like to look back at the introduction to see if I follow my own advice.

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