

*Writing for the AAPG Bulletin:
We're not literary giants,
but we can try to be*

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INTRODUCTION

Many of the manuscripts received for consideration by the *AAPG Bulletin* contain good science but are less than spectacular pieces of writing. Before authors send a manuscript to Tulsa, they need to know that the *Bulletin* is expecting a certain level of quality in a manuscript, and that if two manuscripts describe exactly the same science, the polished manuscript has a much better chance of being accepted than the poorly written one. The following is an attempt to illustrate some of the more common problems and to educate authors, hopefully couched in a form that is palatable, understandable, and maybe just interesting enough that it will actually be read.

Our training is as scientists: Those of us with an English major, or who have even just taken a course in technical writing, are the lucky exceptions. Most of us can apply the Scientific Method, but few of us are intimately familiar with the mechanics of successfully communicating the results of that method. One result of this dichotomy is that a disheveled editor constantly sees the same mistakes in manuscripts submitted for publication.

If an author wants to communicate science and persuade readers that the science is both valid and worth knowing, that author must make the reader's job as easy as possible by writing in an easy-to-follow manner. This is not the same as making the science simplistic. If a reader can't get past the English, the science, simple or complex, will never become an issue.

In fact, most authors are too close to their manuscripts to see the awkward phrases and obscure passages, although they would be quick enough to pick the same mistakes out of a colleague's manuscript. We all think we're good writers, yet some errors must be programmed into the human makeup at birth because they are almost common enough to be predictable. Good writing is apparently not instinctive.

Editing is the alternative to instinct. A good piece of writing, technical or otherwise, even one by a practiced author, is typically

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an achievement attained only after continuous editing and many revisions. The first draft of a manuscript rarely bears more than a passing resemblance to the finished product. Even respected authors with much experience can write something, come back to it later to read it cold, and get caught short thinking “I didn’t mean to say *that!*” Much is going on in the brain during the writing process and it doesn’t all get transferred through the keyboard and onto the hard drive. What does get transferred doesn’t always turn out the way we intended, even though we were convinced that it was absolutely gem quality when we wrote it.

Many publications provide advice on how to write, including the classic *Elements of Style* (Strunk and White, 1979) and the U.S. Geological Survey’s *Suggestions to Authors* (Hansen, 1991). Reading these texts is relatively easy and it all makes sense when absorbing it, but putting it into practice involves a higher level of effort. Instead of duplicating such sage advice, allow me to offer observations on some of the more common flaws and awkward turns found in the manuscripts submitted to the *AAPG Bulletin* during the first half of my term as editor.

Much of the following sounds silly and self-evident out of context, but each observation below is based on numerous suggestions for revision sent to various authors. With some chagrin, I must admit that many of these errors are also recognizable in my own efforts.

DUBIOUS TEXT-FIGURE INTEGRATION

Figures add immeasurably to an article, not the least of which is in breaking up solid blocks of text and generally lightening a manuscript. Don’t forget the introductory figures such as location maps and stratigraphic columns, as they give the reader the context for the discussion. The location map must cover an area large enough that people from other countries can recognize it, and should include latitude and longitude tick marks.

Once introductory figures are out of the way, the remaining figures should precisely illustrate or specifically support concepts that are being explained in the text at the point where the figures are cited. If the text is describing dolomitization, it is less effective to show a generalized photomicrograph of a dolomite than to present a photomicrograph that highlights, with arrows, diagenetic evidence for the discussed dolomitization. This photomicrograph should be from a sample used during the study.

Conversely, some figures present valuable data that have the potential to strengthen a paper by illustrating important concepts, but that merely represent opportunities lost because the figures are never fully discussed. The strongest manuscripts are those that fully integrate the figures into the text, i.e., where the figures offer additional support for, or an illustration of, the argument being developed.

UNHELPFUL FIGURE CAPTIONS

Figure captions should further improve the manuscript and the text-figure integration by specifying the importance of that figure to the text. Captions should not, however, reiterate at length the concepts and descriptions that are already found in the text. Readers must be told specifically what that connection of the figure to the text is because few readers care to play games at reading the author’s mind. A caption such as “Figure 1. Graph of height vs. length” doesn’t have nearly the impact of the more explicit caption “Figure 1. Graph showing that height varies inversely with length, suggesting a genetic relationship.” Amplification of that relationship should be found in the text.

EXTRANEOUS FIGURES AND DATA

Some figures seem to be included more because the author had them handy from a related part of the study than because they support the text. Delete these. In a similar vein, many authors include tables of vaguely related data, sometimes, it seems, merely to impress the reader with how much work was done. This is akin to the proverbial advice given to a speaker: “Your argument is weak here, you had better shout.” Rather, let your work speak for itself in this regard.

Authors with a mathematical or engineering bent often include numerous figures that present similar patterns, commonly from sequential computer runs with only minor tweaking. If the minor variations in the patterns have no significance and are not discussed, elimination of such repetition does not weaken a paper. Print space is too valuable for extraneous figures or data.

FIGURES SWIPED FROM PRESENTATIONS

More and more manuscripts are being submitted that include figures from oral presentations, figures that

have been electronically pasted into the text without modification. This is easy to do in the electronic age, but color figures where the colors have been converted to indistinguishable gray scales instead of to different black and white patterns give readers heartburn.

Many such figures also include meaningless file numbers in the corners, or titles at the top that needlessly duplicate the figure captions. Moreover, many contain labels or features that were obviously important to a related application but that have no meaning for the present manuscript. The author has not bothered to remove them, and they are left to clutter up the figure and distract the reader.

All of the symbols on a graph, and all the geographic labels on an index map (except for things like major towns that help orient the reader), should be those that are important enough to be explained in a legend or caption. Moreover, if they are prominent on a figure, they should have a purpose within the text. Likewise, all geographic features important enough to be referenced or discussed in the text should appear on an index map. Well logs, maps, and cross sections need scales and indications of orientation. These are silly, nitpicking things, but neglecting them reflects poorly on the author.

We are also beginning to see papers where the figures consist of composite, multi-image, full-color montages, complete with circles and arrows on the back. These are suitable for, and have commonly been derived from, poster presentations, but they are too complicated for a text. Although summary block diagrams are useful in many cases, don't try to tell the entire story with figures.

WHIPLASH

It is disconcertingly common for an author to discuss something important in the text that is never mentioned in the abstract or in the conclusions. More unsettling yet to the reader is the paper that includes a topic in the conclusions, or sometimes in the abstract, that is never discussed in the main body of the text. An interesting but less common variation on this theme is a title that doesn't reflect the content of the paper. Conclusions must be derived from something more substantial than thin air. Some authors avoid this particular problem by omitting a Conclusions section, but most reviewers note and object to that.

ABSTRACT VS. INTRODUCTION

There is a difference between writing an abstract that is a summary of an attached paper and writing an abstract for a presentation. The first type, under discussion here, should present the conclusions of the paper and a few pieces of important supporting data. An abstract should hook the reader into delving into the rest of the paper for most of the details. Statements such as "52 coal samples were taken by the Gropengrab method and were measured for 162 elements in the laboratory under simulated rainforest conditions" don't belong in an abstract because most readers don't care about such details at this point. Rather, the stronger abstract indicates what was inferred from those samples and measurements; i.e., "Elemental data from 52 samples suggest that these coals were deposited in deep-marine environments." Now you have the attention of the readers, and they'll dig into the manuscript to find out just what tests you did and how you did them in order to reach that particular conclusion.

The flip side of the coin, of course, is the abstract that doesn't give enough background for the reader to understand it. For example, some abstracts present the reader with undefined terms or acronyms that might as well be in pig Latin for all they add to a reader's comprehension.

Abstracts that do present the conclusions of the paper commonly do so only in generalities when being more specific can immeasurably strengthen the piece. Consider the difference in the level of information conveyed by the two statements, "Deposition of deep-marine coals is related to sea level fluctuations," and "Deep-marine coals were deposited during sea level lowstands." The latter statement encompasses the full concept of the former, yet it also specifies what the relationship is and even lets the reader anticipate the potential implications.

DISORGANIZATION

High school English taught us to make an outline so we could see the overall flow of a text before we wrote it rather than become lost in the forest because trees blocked the view. Few bother with outlines anymore it seems; therefore, an editor commonly sees disorganized papers, papers that contain redundant statements and sections, or papers that mix data with interpretations in the same sections. When this happens, it isn't

always clear that the distinction between data and interpretations is clear to the author, let alone to the reader.

When sections are redundant, the authors either didn't realize they were being repeated and didn't edit the manuscript to check, or felt that the redundancies were necessary. They aren't. The most effective papers still follow some variation of the standard format: Introduction, Data/Descriptions, Interpretations, Discussion, Conclusions—and an outline is still a valuable tool.

UNSUPPORTED PLAUSIBLE THEORIES AND BALD STATEMENTS

Authors who grew up under authoritarian systems tend to expect a reader to accept and believe bald statements (“these are fluvial deposits”) just because the author believes it and is telling the reader it is so. The data necessary to support such interpretive assertions, such as sedimentary structures, fossils, or paleogeography, are omitted.

On the other hand, authors with a penchant for anarchy commonly offer a broader scale of unsupported material, presenting plausible, often good ideas, but without supplying the discussions that dissect and analyze the ideas. The data offered in support of these ideas tend to be broad in scale, not specific to the problem, and commonly do not exclude other theories. Without specific supporting data such ideas are so much speculation and are not suitable for publication.

THE JOY OF THESES

Several authors commonly get together to pool their related theses, and this technique can make an excellent paper. Often as not, however, the result is an unevenly written and poorly integrated product, each section reflecting the different authors' styles and objectives. It usually takes one of the authors with a unifying concept of the problem, and the willingness to make changes in a co-author's wording, to take charge of such an effort and to successfully amalgamate everything into a paper with a smooth flow and common purpose.

If a paper has been derived from a single author's thesis, however, it often contains too much detail that, although appropriate for a thesis, results in a paper

that is much too long for publication in the *Bulletin*. This author must pare down and focus on the best-supported or most appropriate aspect of the thesis, to confine the paper to one strong theme instead of a weaker discourse on all of the various aspects and ramifications of the thesis topic. It is difficult for an author to let go of the related subtopics of a thesis, but if the subtopics can be eliminated without detracting from the main argument, they don't belong and the paper is cleaner and stronger without them.

Speaking of length, under the current space constraints in the *Bulletin*, ideally the main body of a text should run less than about 8000 words and there should be 10–15 figures to accompany it. After the laughter dies down, we start negotiating; however, the *Bulletin* is not accepting long manuscripts at present.

DISTINGUISHING A MODEL FROM ITS APPLICATION

Some manuscripts consist almost entirely of the description and details of the construction of a model. Although models are increasingly important to our science, they are primarily tools, means to an end rather than an end product. The importance of a model lies in its application rather than its construction. A model's value is in its ability to tell us something about the real world. For the *AAPG Bulletin*, most readers want to see one or two examples of how such models have been applied to the exploration and development of hydrocarbon reservoirs, and are less interested in the construction details.

NUTS AND BOLTS

An editor receives numerous manuscripts from authors who have not proofread or even run a basic spell-check program on their manuscripts before mailing them. Words are misspelled, sentences may be incomplete, figures are cited out of sequence, and figures and/or figure captions are omitted. A common problem is references cited in the text that don't appear in the reference list and vice versa. Authors of these papers seem to figure that it is someone else's job to do the nuts and bolts work for them. Although most reviewers and editors don't have time to put up with this, some reviewers in fact use the degree of reference-citation correlation as a preliminary quality check on the manuscript. Either way, be forewarned. Numerous errors

and omissions in these seemingly minor details generally guarantee a negative review regardless of the quality of the science.

Another irritant is the manuscript that doesn't conform to the Instructions to Authors provided by the journal. And, finally, spell out all but the most common acronyms and abbreviations, and avoid acronyms that are unique to your study. Acronyms may make writing easier (a nonissue really in this age of word processing), but they make reading harder.

NON-ENGLISH SPEAKING AUTHORS

The effort of writing something in a language other than the one you grew up with is truly daunting. My hat is off to our authors who do not speak English as a native tongue. Nevertheless, these authors must find a native English speaker to smooth the flow of the grammar, straighten out the syntax, and clarify the vocabulary of the manuscript before submission. If reviewers cannot follow the English, they cannot begin to assess the science.

If the main author is a non-English speaker and has co-authored the paper with an English-speaking colleague, the English-speaking co-author has an obligation to thoroughly edit the manuscript just for English prior to submission.

RELEVANCE TO HYDROCARBON GEOLOGY

Manuscripts for the *AAPG Bulletin* can pertain to any part of geology that has implications for the exploration and development of hydrocarbons. Reviewers typically suggest that papers that do not have such connections, potential or direct, would be more appropriate for another journal. Authors are strongly encouraged to suggest how their studies might be or actually have been applied to, for example, the improvement of recovery efficiency from a related res-

ervoir. The *Bulletin* is not the place to submit papers on the isotopic composition of feldspars on Mars.

SUMMARY

Writing and editing are two separate and very different processes, even though they're perceived as overlapping. Nevertheless, authors should be the first editors of their own masterpieces. After the first flush of successfully completing that long-in-the-process draft of a manuscript, let it cool for a few days or even weeks, then return to it and edit it objectively. And then do it again. And again. And again, until it says at least something close to what was intended. Edit at all levels: words, phrases, sentences, paragraphs, and sections. Make sure the title still reflects the content, as the focus of many papers shifts during writing. Double-check the nuts and bolts; make yourself let go of marginally related passages and figures; remove redundancies.

Occasionally the trick is in knowing when to stop, but there isn't a paper in existence, draft or final form, that can't be improved. The key to semi-objective editing is to put the paper aside for a while so that the synapses don't hold quite so much memory of what the manuscript should say vs. what it actually says. Often a different perspective on the paper can be gained by reading it to yourself out loud. For real objectivity, hand the manuscript to a friend who is not afraid to speak out about perceived problems. At any and every point in the paper where that person has questions, chances are not that the friend is particularly dull, but rather that the writing needs clarification.

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