

If you write it well, they will read it

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Some of you may recall that wonderful line from the movie, *Field of Dreams*, in which a Kansas farmer standing in his cornfield hears a spiritual voice, "If you build it, he will come." The farmer builds it. Then he comes, as do many more. Even if you're not familiar with that movie, the resonance of the line goes beyond that cornfield. If I were that spiritual voice and you were sitting at your desk late one night, writing a paper, I would say, "If you write it well, they will read it." Or, if I had had spicy food for dinner, I might say, "If you write it poorly, they will complain."

And, complain they do! As a fifth-term associate editor for *GEOPHYSICS*, I have read, heard, and sometimes, contributed complaints about articles. In the last few years the complaints about *GEOPHYSICS* articles seem to center more on topic and less on writing quality. For example, I have heard discussions pointing to too many theoretical articles and not enough case studies. The official response to these discussions has to be something like: We can only pick from what is submitted. Unofficially, I consider what is really being said. Are these complaints about topic or are they really about quality, specifically readability v. unreadability?

To support the topical side of this question, consider the demographics. Many data analysts feel that theoretical and modeling papers don't fall within their spheres of interest and, hence, rarely give these articles a second glance. Similarly, many theorists feel the same about case studies. And, who besides modelers ever reads a modeling paper. Each camp likes to point a finger at the other's articles. The conflict is probably as old as technical publication and, probably, will never be resolved. This finger pointing seems to signal that the complaints are topical. Personally, I believe that the finger pointing is only a vehicle and that the root of the complaints is quality. Here's my reasoning.

A good scientist or engineer recognizes that science and technology are supported by a balanced tripartite: theory, data, and modeling. A complete study needs each. Each is necessary to support the other two. If any one of the three is weak, they all are weakened! Theory encapsulates our understanding and allows us to generalize, predict, and, most of all, communicate. Data (i.e., case, lab, or field studies) are the ground truth, our measurements. Modeling, whatever type, quantifies theory, creating synthetic data sets, and linking theory to measurement.

As I said, good science and technology need the tripartite in balance. Similarly, we, as scientists and engineers, need a balance of the three in our technical publications. Surely, we need to read or, at least, scan the articles in each of these areas to stay knowledgeable. Based on this, I believe that good scientists and engineers want to read a sampling of the full breadth of articles in their expertise, but are frustrated by the poor quality of the articles. Or, put slightly differently, the complaints are really about the quality of the writing, not the topics.

Consider now the recurring theme found in manuals or books on technical writing: Too many writers write for themselves and not for their readers. These writers neglect elements that readers need to appreciate, understand,

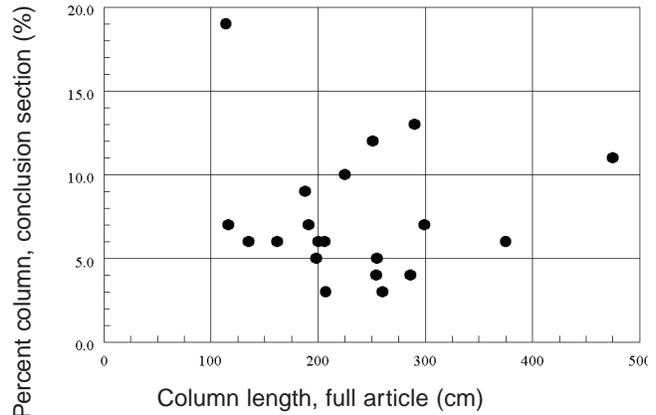


Figure 1.

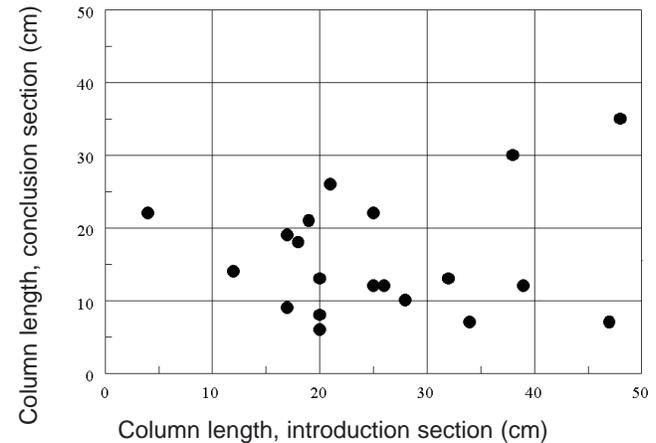


Figure 2.

and use the information described within their papers. To show this, I made an ad hoc study using recent issues of *GEOPHYSICS*. Before I present the study and the findings, let me digress for the next three paragraphs and discuss some elements of technical writing that will help put my data in perspective.

Books and manuals on technical writing consistently define the function(s) of each section of a well-written technical paper. The successful functioning of each section is necessary for meeting the needs of the reader. For example, the introduction identifies and presents the problem. It also gives the background and defines terms needed by the reader to understand and verify the work (i.e., the solution to the problem) discussed in the paper. For continuity with the remaining article, the introduction should foreshadow or summarizes the new material in the article. It must successfully perform all of these functions so that the reader is prepared for the main body of the text.

Similarly, the conclusion, or its equivalent last section in the article, has its own well-defined, reader-needed functions. The conclusion summarizes the results (i.e., data or new information), persuades the reader as to the

value of these results, builds relationships and correlations, and discusses what has been learned. It also tells the reader what the writer expects the reader to do, as a result of having read the article. In general, the conclusion should close out the paper on a positive note, persuading the reader as to the value of having read this paper!

Both the conclusion and the introduction must perform their functions for the paper to be a valuable, readable document. This means that each must comprise a necessary and sufficient percentage of the total length of the article to perform its functions. The relative lengths of the introduction and conclusion are the basis of my ad hoc study.

Returning to my study, I used the introduction and conclusion sections as correlations to the quality of the writing. Since quality of writing in my opinion is not readily quantifiable, I used the lengths of these sections as barometers for gauging the author's understanding and appreciation of the needs of the reader (i.e., the readability of the paper). The hypothesis of the study was that the relative lengths of these sections reflect the relative value that a writer overtly places on readability. I chose the introduction and conclusion because, unlike the main body of the paper, which reflect the writer's ability to report the work, the introduction and conclusion more strongly reflect an author's writing skill. In other words, once the science has been completed, the main body practically "writes itself." In contrast, the introduction and conclusion must be created and written as specifically functioning units.

The study. In the study, I took two issues of *GEOPHYSICS* published in 1997. From these issues, I randomly chose 20 technical articles (10 from each issue), excluding short notes. Then, using a standard ruler, I measured the total column length of each article and the column lengths of its conclusion and its introduction. (Note a single text column of *GEOPHYSICS* is about 23 cm long.) Figures, appendices, acknowledgements, references, etc. were not included in the measurements. I only measured the length of technical text. The results of the study are shown in the two figures.

Figure 1 shows the percentage of column length of the conclusion (i.e., {Conclusion length divided by full article length} × 100%). For these 20 articles, the full article lengths ranged from 100 cm to nearly 500 cm, while the conclusion percentages range from about 3% to an anomalously high 19%. The interesting characteristics in these data are the two trends. About half the articles show an upward trend with increasing article length: the longer the article, the increased emphasis on the conclusion. The remaining articles seem to show a flat, or possibly decreasing, trend: a 3% to 7% conclusion, independent of the article length.

It seems to me that, as an article becomes longer, the percent dedicated to the conclusion should increase to some reasonable maximum. If articles maintained a fixed percentage for the conclusion instead of increasing with increasing length, then each increment of main body text would correspond to one unit of conclusion length. Hence, increasing the main body length gives a comparable linear increase in conclusion, keeping the percentage of conclusion fixed. This precludes the possibility that different increments in the main text can correlate and therefore add a nonlinear component (i.e., additional information) to the length of the conclusion. If this were not the case, then the

length of the article would not be justified; too much is discussed in the main text compared to what can be concluded or learned (i.e., a poorly-written article).

Figure 2 complements the findings of Figure 1. Figure 2 shows column length of the conclusion versus the column length of the introduction for the same 20 articles. Note again the dual distribution. For about half of the articles, these lengths are proportional. For the remaining articles, the conclusion length seems independent of the introduction length. Interestingly, the introduction for these articles seems fixed at about 10 cm. These articles show a very common characteristic of weak articles: a single-paragraph conclusion. I invite you to do your own ad hoc study and see how many 10-cm conclusions you find in an issue.

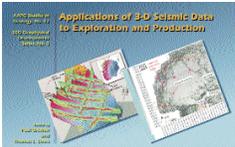
I interpret the two trends in Figure 2 to show two general classes of writers. One class is those who recognize that as the background, perspective, and problem-definition section grows in length, equivalently so must the benefit section. The other class of writers, those whose conclusions are ~10 cm, seems to be writers who are "out of breath" or, to use a pun, "are out of breadth" and simply shut the door on the writing exercise. One can only surmise that as the reader progresses through this type of article, the article reads more and more tired!

Early in this column I stated that there was discontent voiced by some readers of *GEOPHYSICS* and that the discontentedness would appear to be topical. I have tried to show that it is not topical, but is a lament on the quality of writing of too many of the articles. Reviewers and editors can only do so much; in the end the responsibility for the quality of the writing rests firmly on the author(s).

So, what's all this to mean. Am I simply stating the obvious? Perhaps, or perhaps I'm trumpeting yet another wake-up call! Many writers need to drop the attitude that, since they have been successful at getting articles through the system (i.e., published), they are good or, at least, capable writers! If that were the case why do we hear complaints? As I see it, publication success is not necessarily a statement of writing success, but a weakness in the system—a system that fails to require good writing. But that's a column for another time. ☐

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