

Table 1. A summary of the ten rules and how to tell if they are being violated.

Rule	Sign it is violated
1: Focus on one big idea	Readers cannot give 1-sentence summary.
2: Write for naive humans	Readers do not “get” the paper.
3: Use context, content, conclusion structure	Readers ask why something matters or what it means.
4: Optimize logical flow	Readers stumble on a small section of the text.
5: Abstract: Compact summary of paper	Readers cannot give the “elevator pitch” of your work after reading it.
6: Introduction: Why the paper matters	Readers show little interest in the paper.
7: Results: Why the conclusion is justified	Readers do not agree with your conclusion.
8: Discussion: Preempt criticism, give future impact	Readers are left with unanswered criticisms and/or questions on their mind.
9: Allocate time wisely	Readers struggle to understand your central contribution despite your having worked hard.
10: Iterate the story	The paper’s contribution is rejected by test readers, editors, or reviewers.

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Rule 10: Get feedback to reduce, reuse, and recycle the story

Writing can be considered an optimization problem in which you simultaneously improve the story, the outline, and all the component sentences. In this context, it is important not to get too attached to one’s writing. In many cases, trashing entire paragraphs and rewriting is a faster way to produce good text than incremental editing.

There are multiple signs that further work is necessary on a manuscript (see [Table 1](#)). For example, if you, as the writer, cannot describe the entire outline of a paper to a colleague in a few minutes, then clearly a reader will not be able to. You need to further distill your story. Finding such violations of good writing helps to improve the paper at all levels.

Successfully writing a paper typically requires input from multiple people. Test readers are necessary to make sure that the overall story works. They can also give valuable input on where the story appears to move too quickly or too slowly. They can clarify when it is best to go back to the drawing board and retell the entire story. Reviewers are also extremely useful. Non-specific feedback and unenthusiastic reviews often imply that the reviewers did not “get” the big picture story line. Very specific feedback usually points out places where the logic within a paragraph was not sufficient. It is vital to accept this feedback in a positive way. Because input from others is essential, a network of helpful colleagues is fundamental to making a story memorable. To keep this network working, make sure to pay back your colleagues by reading their manuscripts.

Discussion

This paper focused on the structure, or “anatomy,” of manuscripts. We had to gloss over many finer points of writing, including word choice and grammar, the creative process, and collaboration. A paper about writing can never be complete; as such, there is a large body of literature dealing with issues of scientific writing [[9,10,11,12,13,14,15,16,17](#)].

Personal style often leads writers to deviate from a rigid, conserved structure, and it can be a delight to read a paper that creatively bends the rules. However, as with many other things in life, a thorough mastery of the standard rules is necessary to successfully bend them [[18](#)]. In following these guidelines, scientists will be able to address a broad audience, bridge disciplines, and more effectively enable integrative science.