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Geosc 203

Paper: Clear as Mud, Knight, Jonathan. *Nature,* **423**, 376-378, May 2003.

In "Clear as Mud," Jonathan Knight argues that scientific journal articles have become "increasingly opaque" over the last 50 years, with readers forced to contend with a "jungle of jargon," a high percentage of uncommon words, and an "alphabet soup" of acronyms. Knight poses the bottom line question--given that most scientists write regularly but receive minimal training in writing--of whether science might become more readable if researchers went back to school for writing lessons.

To measure the complexity of science writing, language experts turn to researchers such as Donald Hayes of Cornell University, who has developed a numerical scale of lexical difficulty, called LEX, to quantify language based on frequency of use. Essentially, the more commonly words are used, the lower their place on the LEX scale--as in golf, the lower scores are the more desirable ones. Hayes "plots the 'cumulative proportion' of each word against the log of its rank," and thus comes up with a LEX readability score for articles and magazines. As the article graph shows, current scientific papers in *Nature* and *Science* score around 30, while 50 years ago their scores were half that number, and a hundred years ago the scores for papers in these publications were near 0.

So how is this problem being addressed? *Science* magazine recently began adding "one-line explanations of its papers to its table of contents," while several other magazines began featuring a few papers that are written in accessible language designed to appeal to a broader science audience. Even the internet is being used as a simplifying tool. Each week, *Science* magazine's on-line edition offers commentary on a published paper with hyperlinks built in so readers can readily track down new terms or jump to other websites for more information. Such strategies can backfire though, as the article notes, in that "scientists can be suspicious of lay summaries, fearing that they are oversimplified or inaccurate."

Other writing improvement tactics discussed in the article include hiring professional editing services, awarding prizes for the best-written scientific papers, and following the model taught by Judith Swan of Princeton University. Swan's writing model relies heavily on location of material--arguing that old (known) information is more accessible when placed at the beginning of the sentence in the topic position, while new information should be located in the "stress position" at the end of the sentence where readers naturally expect it. Swan's model even embraces the passive voice as long as the principles of topic position and stress position are not violated.

My opinion on the subject of improving writing style comes down to practice, emulation, and the act of reading analytically. While scales such as the LEX and the even more well-known Gunning-Fog Index are useful diagnostic tools and serve as intellectual gymnastics for some, they don't provide as clear a pathway for effective revision as Swan's model does. Unlike Christopher Miller, cited in the article as one who believes that writing cannot be taught, I believe that scientists can improve their writing by identifying and modifying their particular habits, studying and emulating the work of others, consciously writing to simplify and clarify, and reading with greater discernment.

Writing Summaries in Geosciences 203

10 Tactics for Reading Scientific Articles

1. Look for a "top down" approach in newspaper articles; look for an objective or key opening statement in scientific reports.

2. Attend well to the title and any "call out" information.

3. Read for logos (appeals to reason), ethos (establishment of credibility), and pathos (appeals to emotion).

4. Look for bottom lines.

5. Note coherence clues such as transitions, especially at the beginnings of sentences and paragraphs.

6. Pay special attention to key words and definitions.

7. Recognize the value of analogies and metaphors.

8. Note how active verbs are used to explain phenomena or interpret data.

9. Study the graphics, looking especially for trends and direct explanations.

10. Articulate and compare the introduction's objective or key statement and bottom line conclusion.