The Order of Authors' Names*

Jose Delagarza was a postdoctoral fellow researching the way a particular disease progressed. He developed a hypothesis that a nontoxic substance might effectively treat certain aggressive forms of cancer while reducing the devastating side effects of conventional chemotherapy. To test his idea, he outlined a complex research plan. His postdoctoral advisor, Dr. Bill Cummings, supported this approach, but parts of Delagarza's proposal were beyond Cummings's expertise. Cummings, a nontenured assistant professor, suggested that Delagarza present his proposal during a department seminar to elicit suggestions from other faculty.

During the seminar, Dominick Cerino, PhD, head of the department in which both Cummings and Delagarza worked, showed great enthusiasm for the project, making several suggestions and encouraging Delagarza and Cummings to proceed.

Delagarza's pharmacological approach appeared to reduce the progression of tumors in animals. This study was almost certain to receive media attention when it appeared in the scientific journals. In the formal scientific report, Delagarza indicated Cummings as last author because Cummings had supervised the work on a day-to-day basis. He also knew this acknowledgment would help Cummings in his bid for tenure and promotion.

Cummings thought that it would be wise to show the manuscript to Cerino before submitting it to a prestigious journal, believing the department head would be proud of this breakthrough work. Moreover, Cerino was a member of the editorial board of the journal Delagarza hoped would publish the article. Although Cerino would not himself review the article, he might suggest reviewers who would be favorably disposed to the work. Cummings checked to ensure that Delagarza had acknowledged Cerino's helpful suggestions in the acknowledgment section of the paper, and asked Delagarza to show the paper to Cerino.

Cerino liked the manuscript but took notice of the acknowledgment of his suggestions. He insisted instead that he be listed as a coauthor, and, moreover, that his name appear last in the list (the senior author). He held that although he had not performed the experiments, his comments during seminars constituted the intellectual driving force behind Delagarza's work. Moreover, Cerino believed he had contributed by providing the scientific environment in which the study flourished. He had, after all, recruited Cummings to the department.

Dr. Cummings believed that he deserved senior author status because he had directly supervised Delagarza's work from beginning to end but was concerned that if he raised the issue, Cerino would retaliate by not supporting his promotion and tenure. Both Delagarza and Cummings knew that Dr. Cerino had an application to renew a grant pending before a federal funding agency. He would almost certainly report this new study in support of the application, primarily to signify his own value to the field. Dr. Cummings wondered if, when the day of publication came, Dr. Cerino would also want to hold a press conference to report the findings and if he, as senior author, would claim credit for the work.

Neither Delagarza nor Cummings was certain if they should let the matter drop or pursue it further. Delagarza, especially, did not want to raise a fuss, since hostility from Cerino could interfere with getting a job later on.
Questions

1. What are the nature and extent of Dr. Cerino's contribution to this article? Are they as extensive as he believes than to be?
2. Should Dr. Cerino be acknowledged as an author—in any sense—of this article?
3. Do you believe that the potential for retaliation is reason enough to accommodate Dr. Cerino's interest in being listed as senior author? If not, how might the postdoctoral fellow and junior faculty member respond to Cerino's claim to being senior author?

*Prepared by Robert Folberg, Frances B. Geever Professor, Department of Pathology, University of Illinois College of Medicine at Chicago.*
Deciding Authorship

Dr. Gumshoe is a family physician specialist conducting a clinical trial on a new treatment for foot wounds for people with diabetes. The treatment is a cream she developed. Although all of the compounds in the cream have been approved by the U.S. Food and Drug Administration (FDA), the treatment itself has not. The FDA has classified it as an investigational combination therapy. Dr. Gumshoe has completed the clinical trial, which has demonstrated that the new treatment is twice as effective as current therapy for diabetic foot wounds. She is getting ready to publish a paper and needs to decide (a) who should be an author and (b) the order of authorship. The following people have worked on the project:

- Dr. Gumshoe developed the cream, designed the experiments, interpreted the data, and wrote the paper.
- Dr. Wainwright is a pharmacist who helped Dr. Gumshoe develop the cream, interpret the data, and edit the paper.
- Dr. Sabrunama is a biostatistician who helped to design the experiments and analyze and interpret the data and who read the paper but did not edit it for content.
- Ms. Stetson is a nurse who provided treatment to patients in the study and collected data and who read the paper but did not edit it for content.
- Ms. Williams is a medical student who provided treatment to patients in the study and collected data and who read the paper but did not edit it for content.
- Mr. Gumshoe is Dr. Gumshoe's husband. He has been providing legal assistance to Dr. Gumshoe concerning her FDA and institutional review board applications and patents on the treatment. He read the paper and edited it for style and grammar.
- Mr. Jensen is a pharmacy technician who works for Dr. Wainwright who helped to prepare the treatment.
- Dr. Chu is a colleague of Dr. Gumshoe's. He has discussed the project with her several times over lunch. He encouraged her to initiate the clinical trial and has given her critical feedback.
- Dr. Rogers is a diabetic foot specialist. He has provided Dr. Gumshoe with tissue samples and data that she has used in her study.

Questions
1. Who should be an author?
2. Who should receive an acknowledgment?
3. What should be the authorship order?
How Myths Are Made

Guardian, 8 August 2009

Much of what we cover in this column revolves around the idea of a ‘systematic review, where the literature is surveyed methodically, following a predetermined protocol, to find all the evidence on a given question. As we saw in another column, for example, the Soil Association would rather have the freedom to selectively reference only research that supports their case, rather than the totality of the evidence.

Two disturbing news stories demonstrate how this rejection of best practice can also cut to the core of academia.

Firstly, the Public Library of Science in the US this week successfully used a court order to obtain a full trail of evidence showing how pharmaceutical company Wyeth employed commercial ‘ghost writers’ to produce what were apparently academic review articles, published in academic journals, under the names of academic authors. These articles, published between 1998 and 2005, stressed the benefits of taking hormones to protect against problems like heart disease, dementia and ageing skin, while playing down the risks. Stories like this, sadly, are commonplace; but to understand the full damage that these distorted reviews can do, we need to understand a little about the structure of academic knowledge.

In a formal academic paper, every claim is referenced to another academic paper: either an original research paper, describing a piece of primary research in a laboratory or on patients; or a review paper which summarises an area. This convention gives us an opportunity to study how ideas spread, and myths grow, because in theory you could trace who references what, and how, to see an entire belief system evolve from the original data. Such an analysis was published this month in the British Medical Journal, and it is quietly seminal.

Steven Greenberg from Harvard Medical School focused on an arbitrary hypothesis: the specifics are irrelevant to us, but his case study was the idea that a protein called β amyloid is produced in the skeletal muscle of patients who have a condition called 'inclusion body myositis'. Hundreds of papers have been written on this, with thousands of citations between them. Using network theory, Greenberg produced a map of interlocking relationships, to demonstrate who cited what.

By looking at this network of citations he could identify the intersections with the most incoming and outgoing traffic. These are the papers with the greatest ‘authority’ (Google uses the same principle to rank webpages in its search results). All of the ten most influential papers expressed the view that β amyloid is produced in the muscle of patients with IBM. In reality, this is not supported by the totality of the evidence. So how did this situation arise?

Firstly, we can trace how basic laboratory work was referenced. Four lab papers did find β amyloid in IBM patients' muscle tissue, and these were among the top ten most influential papers. But looking at the whole network, there were also six very similar primary research papers, describing similar lab experiments, which are isolated from the interlocking web of citation traffic, meaning that they received no or few citations. These papers, unsurprisingly, contained data that contradicted the popular hypothesis. Crucially, no other
papers refuted or critiqued this contradictory data. Instead, those publications were simply ignored.

Using the interlocking web of citations, you can see how this happened. A small number of review papers funnelled large amounts of traffic through the network, with 63 percent of all citation paths flowing through one review paper, and 95 per cent of all citation paths flowing through just four review papers by the same research group. These papers acted like a lens, collecting and focusing citations — and scientists’ attention — on the papers supporting the hypothesis, in testament to the power of a well-received review paper.

But Greenberg went beyond just documenting bias in what research was referenced in each review paper. By studying the network, in which review papers are themselves cited by future research papers, he showed how these reviews exerted influence beyond their own individual readerships, and distorted the subsequent discourse, by setting a frame around only some papers.

And by studying the citations in detail, he went further again. Some papers did cite research that contradicted the popular hypothesis, for example, but distorted it. One laboratory paper reported no β amyloid in three of five patients with IBM, and its presence in only a 'few fibres' in the remaining two patients; but three subsequent papers cited these data, saying that they confirmed' the hypothesis. This is an exaggeration at best, but the power of the social network theory approach is to show what happened next: over the following ten years, these three supportive citations were the root of 7,848 supportive citation paths, producing chains of false claim in the network, amplifying the distortion.

Similarly, many papers presented aspects of the β amyloid hypothesis as a theory — but gradually, through incremental mis-statement, in a chain of references, these papers came to be cited as if they proved the hypothesis as a fact, with experimental evidence, which they did not.

This is the story of how myths and misapprehensions arise. Greenberg might have found a mess, but instead he found a web of systematic and self-reinforcing distortion, resulting in the creation of a myth, ultimately retarding our understanding of a disease, and so harming patients. That's why systematic reviews are important, that's why incremental mis-statement matters, and that's why ghost writing should be stopped.

Questions

1. Goldberg argues that highly cited papers act as a lens through which later work is evaluated and interpreted, thus biasing and possibly distorting the body of knowledge. Is this a flaw in the publication system or is it part of the normal functioning of research?
2. Why might particular papers be more highly cited than others? Is it an indicator of a paper’s quality?
3. Arguably the paper that challenged the hypothesis was misrepresented in the subsequent three citations. How might this have happened?
4. What can researchers do to resolve or mitigate the distorting effects of highly cited research? What can be changed in how research is structured?
5. Goldberg briefly mentions ghostwriting. What is it? Does it threaten good research and scholarship practices? Why?