The writing & publication process

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Outline for today

-The **inspiration** behind papers
-The **art** of paper writing
-The **psychology** of dealing with reviewers and editors

Based on some recent commentary:

McDonnell, J.J., 2019. Step up to leadership for mid-career growth. Nature, DOI:*10.1038/d41586-019-01936-7*.

McDonnell, J.J., 2017. Paper writing gone Hollywood. *Science*, 355(6320):102

McDonnell, 2017. The sustainable professor. Science, 357(6356):1202

McDonnell, J.J., 2016. The 1-hour work day. Science, 353(6300):718.

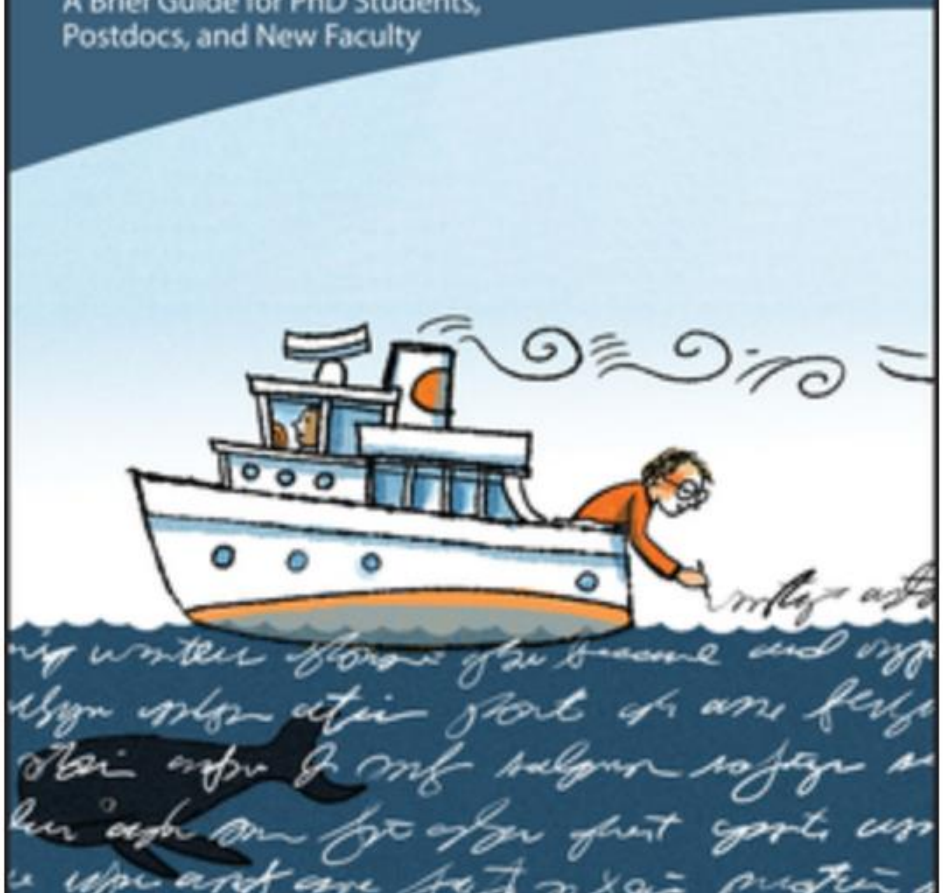
McDonnell, J.J., 2015. Creating a research brand, Science 349 (6249):758

SPECIAL PUBLICATIONS SERIES

AGU 100

Navigating an Academic Career

A Brief Guide for PhD Students, Postdocs, and New Faculty



Jeffrey McDonnell

WILEY

Beginning vs end of the writing process

John Paul Newman @johnpaul_newman · Mar 14

66 1.9K 8.5K

The inspiration behind papers

A quote from a successful scientist..

"Research is to see what everyone else has seen, and *thinking what no one else has thought"*

Albert Szent-Gyorgyi

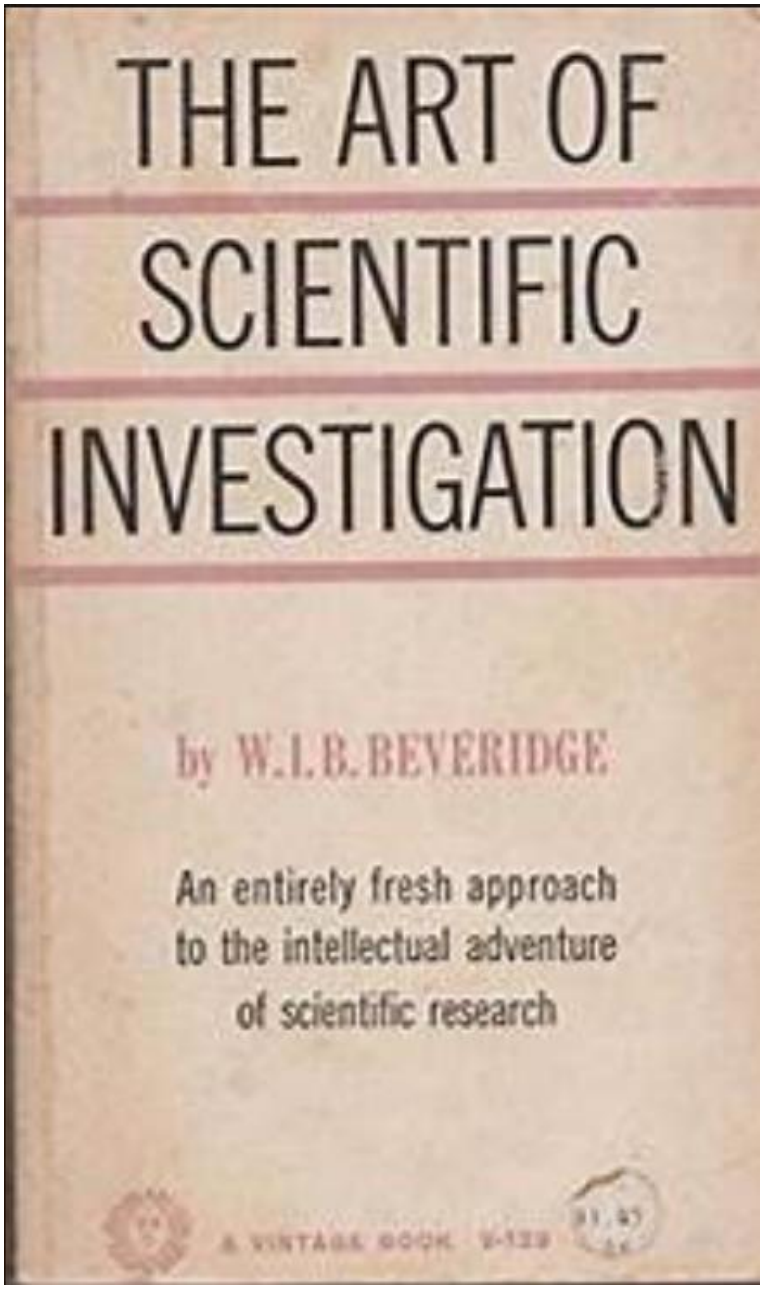
To have a good idea, you need to have a lot of ideas!

How do you get paper ideas?

…skim reading

…linking up ideas whose connection was not previously suspected

…using analogy to suggest clues and hypotheses; to help comprehend phenomena and occurrences we cannot see



THE CHRONICLE
of Higher Education
chronicle.com
June 18, 2010 • $3.75
Volume LVI, Number 38

We Must Stop the Avalanche of Low-Quality Research

EVERYBODY AGREES that scientific research is indispensable to the nation's health, prosperity, and security. In the many discussions of the value of research, however, one rarely hears any mention of how much publication of the results is best. Indeed, for all the regrets one hears in these hard times of research suffering from financing problems, we shouldn't forget the fact that the last few decades have seen astounding growth in the sheer output of research findings and conclusions. Just consider the raw increase in the number of journals. Using *Ulrich's Periodicals Directory,* Michael Mabe shows that the number of "refereed academic/scholarly" publications grows at a rate of 3.26 percent per year (i.e., doubles about every 20 years). The main cause: the growth in the number of researchers.

Many people regard this upsurge as a sign of health. They emphasize the remarkable discoveries and breakthroughs of scientific research over the years; they note that in the *Times Higher Education*'s ranking of research universities around the world, campuses in the United States fill six of the top 10 spots. More published output means more discovery, more knowledge, ever-improving enterprise.

If only that were true.

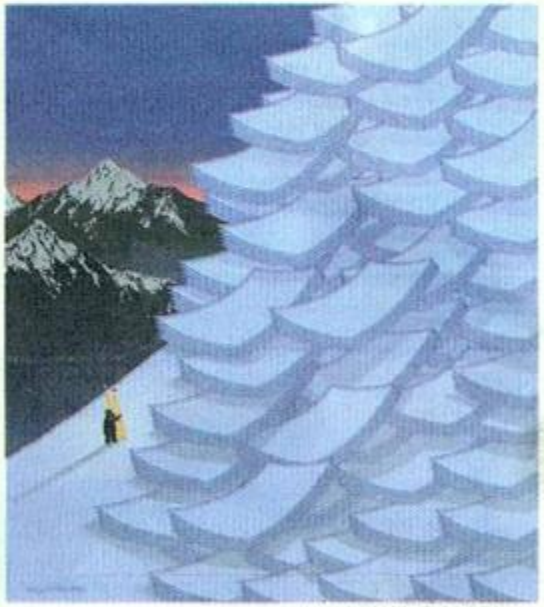
While brilliant and progressive research continues apace here and there, the amount of redundant, inconsequential, and outright poor research has swelled in recent decades, filling countless pages in journals and monographs. Consider this tally from *Science* two decades ago: Only 45 percent of the articles published in the 4,500 top scientific journals were cited within the first five years after publication. In recent years, the figure seems to have dropped further. In a 2009 article in *Online Information Review,* Péter Jacsó found that 40.6 percent of the articles published in the top science and social-science journals (the figures do not include the humanities) were cited in the period 2002 to 2006.

As a result, instead of contributing to knowledge in various disciplines, the increasing number of low-cited publications only adds to the bulk of words and numbers to be reviewed. Even if read, many articles that are not cited by anyone would seem to contain little useful information. The avalanche of ignored research has a profoundly damaging effect on the enterprise as a whole. Not only does the unsited work itself of the findings of just one of the students. One famous physicist has some 450 articles using such a strategy.

In addition, as more and more journals are initiated, especially the many new "international" journals created to serve the rapidly increasing number of English-language articles produced by academics in China, India, and Eastern Europe, libraries struggle to pay the notoriously high subscription costs. The financial strain has reached a critical point. From 1978 to 2001, libraries at the University of California at Los Angeles, for example, saw their subscription costs alone climb by 1,300 percent.

The amount of material one must read to conduct a reasonable review of a topic keeps growing. Younger scholars can't ignore any of it—they never know when a reviewer or an interviewer might have written something disregarded—and so they waste precious months reviewing a pool of articles that may lead nowhere.

Finally, the output of hard copy, not only print journals but also articles in electronic format downloaded and printed, requires enormous amounts of paper, energy, and space to produce, transport, handle, and store—an environmentally irresponsible practice.



MICHAEL GLENWOOD FOR THE CHRONICLE

LET US go on.

Experts asked to evaluate manuscripts, results, and promotion files give them less-careful scrutiny or pass the burden along to other, less-competent peers. We all know busy professors who ask Ph.D. students to do their reviewing for them. Questionable work finds its way more easily through the review process and enters into the domain of knowledge. Because of the accelerated pace, the impression spreads that anything more than a few

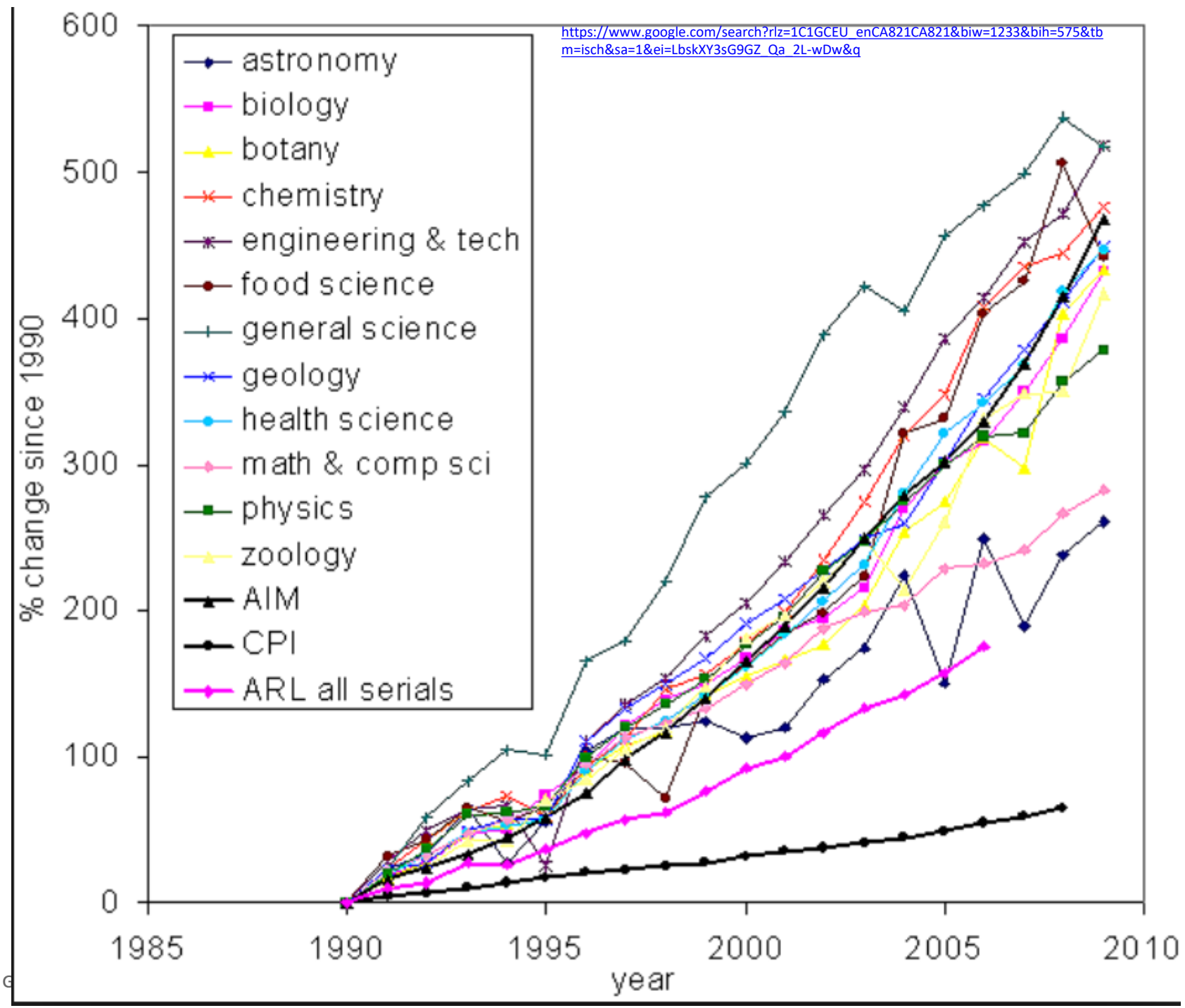
initiated changes in hiring and promotion criteria and ordered their libraries to stop paying for low-cited journals, they would perform a national service. We need to get rid of administrators who reward faculty members on printed pages and downloads alone, deans and provosts "who can't read but can count," as the saying goes. Most of all, we need to understand that there is such a thing as overpublication, and that pushing thousands of researchers to issue mediocre, forgettable arguments and findings is a terrible misuse of human, as well as fiscal, capital.

Several fixes come to mind:

First, limit the number of papers to the best three, four, or five that a job or promotion candidate can submit. That would encourage more comprehensive and focused publishing.

Second, make more use of citation and journal "impact factors," from Thomson ISI. The scores measure the citation visibility of established journals and of researchers who publish in them. By that index, *Nature* and *Science* score about 30. Most major disciplinary journals, though, score 1 to 2, the vast majority score below 1, and some are hardly visible at all. If we add those scores to a researcher's publication record, the publications on a CV might look considerably different than a mere list does.

Third, change the length of papers published in print: Limit manuscripts to five to six journal-length pages, as *Nature* and *Science* do, and put a longer version up on a journal's Web site. The two versions would work as a package. That approach could be enhanced if university and other research libraries formed buying consortia, which would pressure publishers of journals more quickly and aggressively to pursue this third route. Some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astronomy
biology
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chemistry
engineering & tech
food science
general science
geology
health science
math & comp sci
physics
zoology
AIM
CPI
ARL all serials
% change since 1990
600
500
400
300
200
100
0
1985
1990
1995
2000
2005
2010
year

“Whenever I want to read a paper, I write one”!

Benjamin Disreili

Successful scientists work on important problems

Richard Hamming

``You and Your Research''

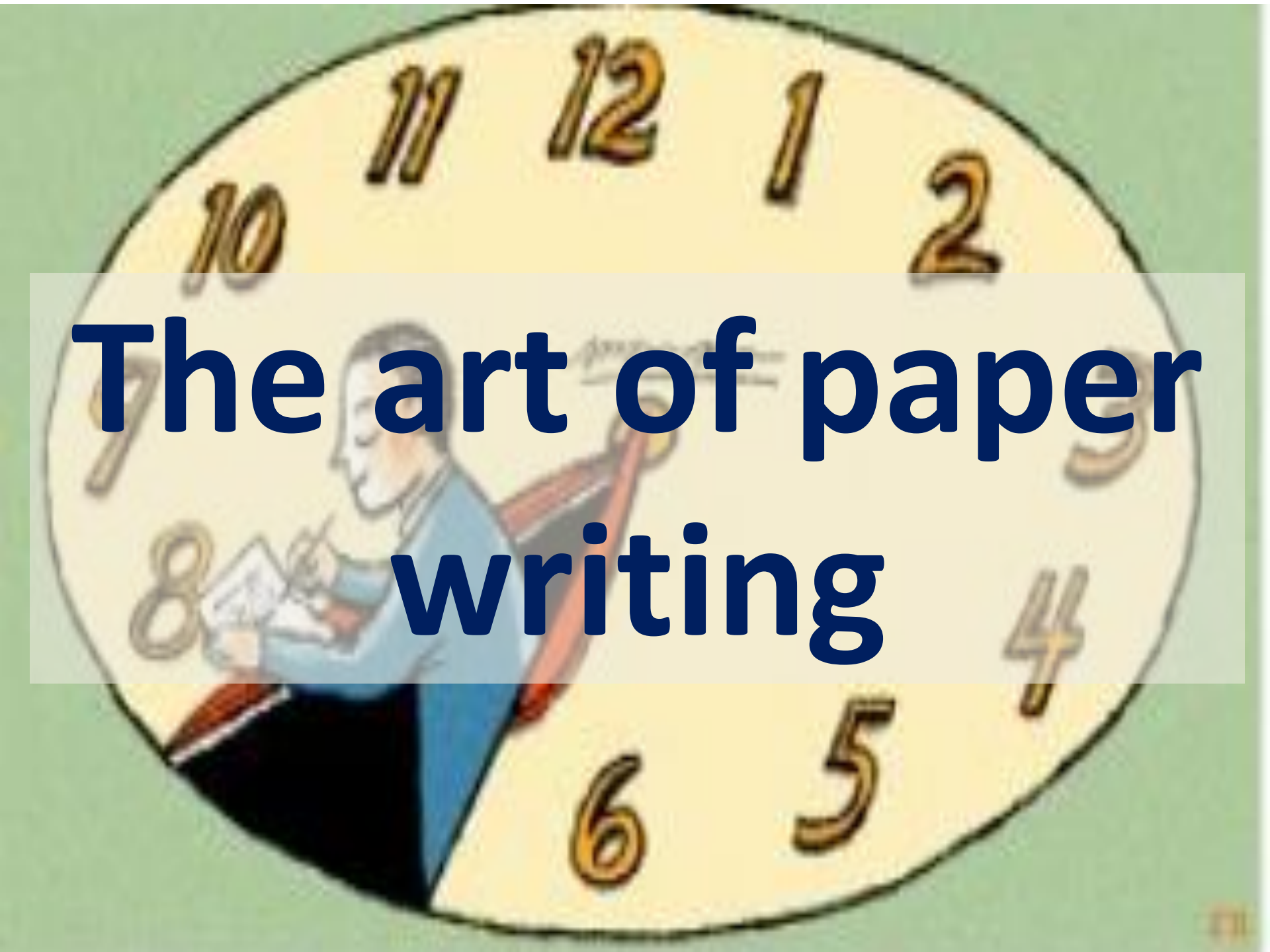
Transcription of the
Bell Communications Research Colloquium Seminar
7 March 1986

J. F. Kaiser
Bell Communications Research
445 South Street
Morristown, NJ 07962-1910
jfk@bellcore.com

"If you do not work on an important problem, it's unlikely you'll do important work"

Helmholtz Association motto:
"Research for grand challenges"

What you are trying to do…



The art of paper writing

“What is important is seldom urgent and *what is urgent is seldom important*”
Dwight Eisenhower

The 1-hr work day

Helps you feel like you accomplished "something" that day

Keeps you 'fit' and 'in condition'

Keeps your main thing, the main thing

Recognizes that focuses bursts are best

In any sport, one must stay toned and conditioned.

Fall out of practice and you quickly lose that fitness, and writing and editing become labored.

So, even though distractions abound, protect that daily 'workout' at the keyboard

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WORKING LIFE

By Jeffrey J. McDonnell

The 1-hour workday

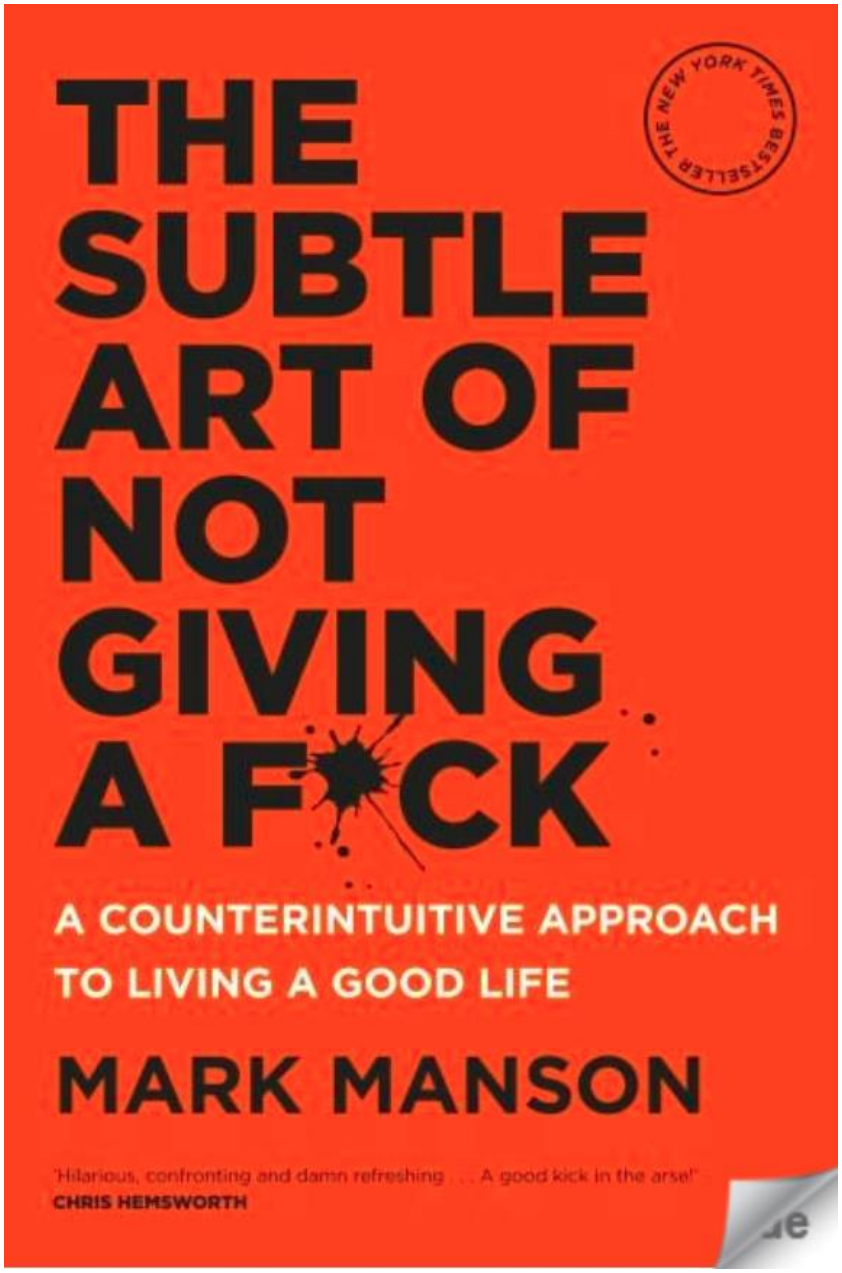
When I was an assistant professor, I felt constantly overwhelmed. I had classes to teach, relationships with new colleagues to navigate, a lab group to assemble, and an infant at home—not to mention research to conduct and papers to publish. To get ahead, I took on any opportunities that were offered, including membership on various editorial boards and professional committees. Despite working like a madman, my productivity as measured by paper output was meager. I simply could not find time in my day for undistracted writing. And when I did find the time after an extended stretch away from writing, the warm-up

Successful writers get things done…

The "Do Something" Principle

…inspiration→motivation→ desirable action

…action→inspiration→ motivation



The topdown approach to paper writing

The top-down approach

Pitch the story:

-What's the status quo?

-What's wrong with the status quo?

-How does the paper go beyond the status quo?

The topdown approach: ‘cont

Develop an outline with headings and subheadings

Iterate on this many times, adding sub-sub-headings

Identify key figures to tell the story

The sub, sub-headings become the paragraph topics

Make writing assignments to co-authors
A divide and conquer approach

The topdown approach: Summary

Do not start any writing until:

- the outline is rock-solid
- figures are made
- Subheadings = paragraph topics
- Every single section maps to the novelty/compelling need for this paper in the journal literature

WORKING LIFE

By Jeffrey J. McDonnell

Paper writing gone Hollywood

"So you want to be a writer?" one of my professors asked me when he learned I was interested in a career as an academic scientist—a pointed warning that a life of science is also a life of writing. But even knowing this in advance, I found that writing was a challenge as I made my way down the tenure track. I had trouble finding stories in my data sets. Even when I had a good tale, I struggled to tell it. I tried starting with the opening sentences and hoping I'd make it to the paper's end. But more often than not, I wrote my way down many blind alleys. My permanently unfinished papers outnumbered my published ones. Worst of all, I was not helping my Ph.D. students and postdocs learn proper writing craft.

My big break came shortly after getting tenure. In a passing conversation, a senior colleague mentioned that his process for writing research papers centered on structure. Rather than focus on words and sentences, the part of writing that so bogged me down, he highlighted the importance of outlining the overall story to be told. I had thought that the standard paper structure—introduction, methods, results, discussion, conclusions—was enough to keep me on track. But my colleague helped me realize that, even with those sections, there is still enough freedom to get stuck in writing cul-de-sacs.

I now see each of the standard paper sections as its own Russian nesting doll. Writing papers is easiest when you spend considerable thought and time stacking all these pieces first. I call it the top-down writing approach.

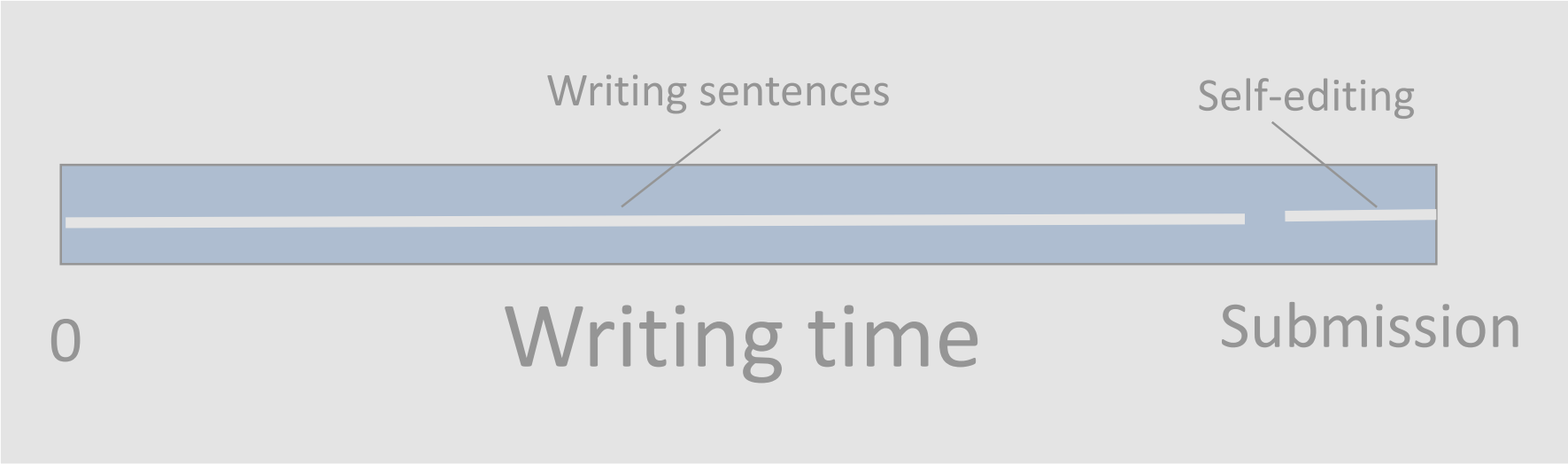
Each of my group's papers now starts with a storyboard session at a whiteboard. I pretend to be a big-time Hollywood producer and ask the Ph.D. student or postdoc to play

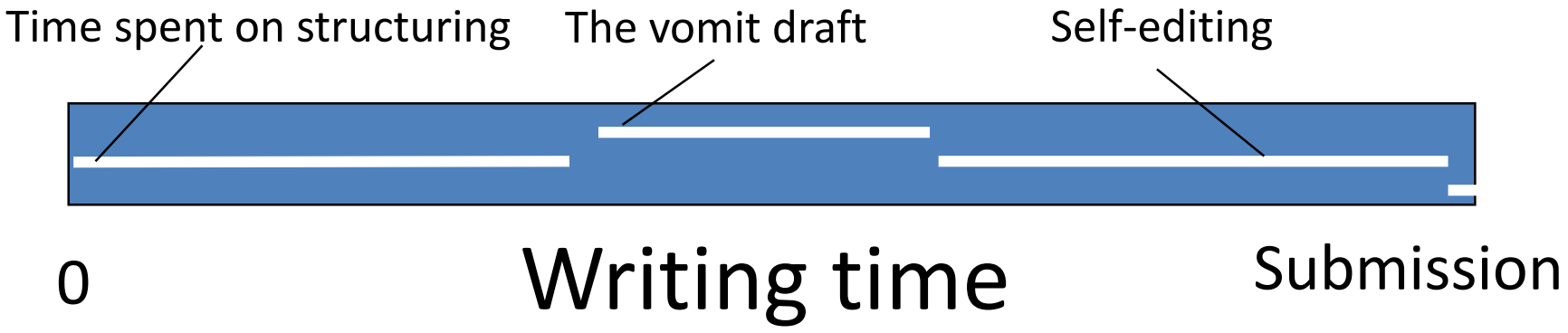
"I ... ask the Ph.D. student or postdoc to play the role of would-be movie director."

wonder why we need yet another paper on that topic. Too little about how the work goes beyond what others have done and the novelty is unclear. The result is a roadmap of the novel elements in the work, which brings the discussion—the other tough section for the writing newcomer—into final focus.

Once the pitch makes sense, we go back and forth stacking the Russian dolls on the whiteboard until the outline subheadings become paragraph topics, with every paragraph explicitly represented in the outline. Honing this outline prior to any writing allows us to determine whether the research story resonates from start to finish. We might spend days or weeks on the outline to get it right, but it's time well spent. The slavish adherence to nested headings shows at a glance whether the paper makes a clear and worthy contribution; whether the title, objectives, and results are properly aligned; what figures are truly essential to the storyline; and whether the message hums. Writing then becomes a much easier process of filling in the blanks. The pa-

A different sort of writing; a different sort of writing timeline





The vomit draft

"Write tipsy; edit with coffee."

Anonymous

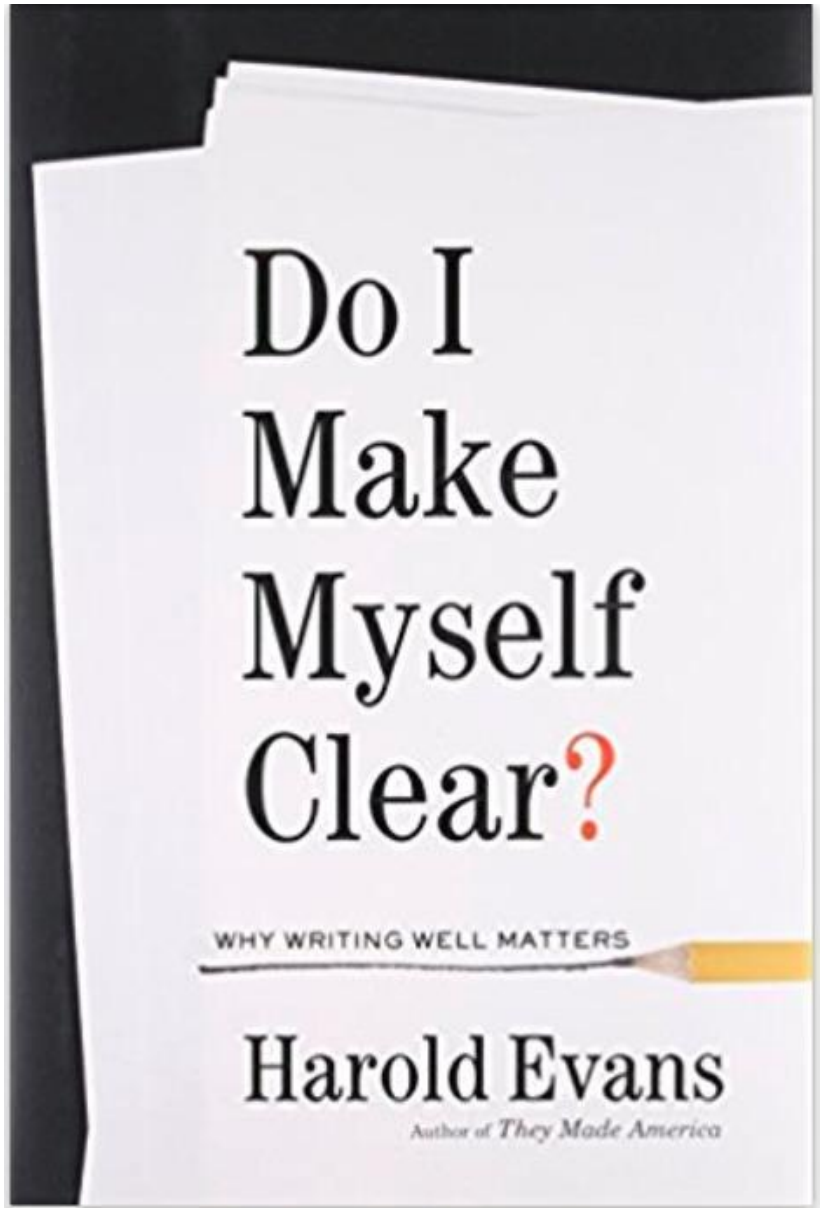
Self-editing

"If I had more time, it could have been shorter."

Blaise Pascal

Self-editing

- *Squeeze out excess words*
- *Be ruthless*
- *Active voice*
- *Subject and verb up-front in all sentences*




The psychology of dealing with reviewers, editors & journals

Perhaps why I am here today…

Aug 2018

Giova,

"…it seems much more like a 'major revision'. And, one where if you sent in a new manuscript but also included detailed responses to these two reviewers, that might be an easier and quicker pathway to publication than starting fresh with…"

-Jeff

Nature Geoscience

@NatureGeosci

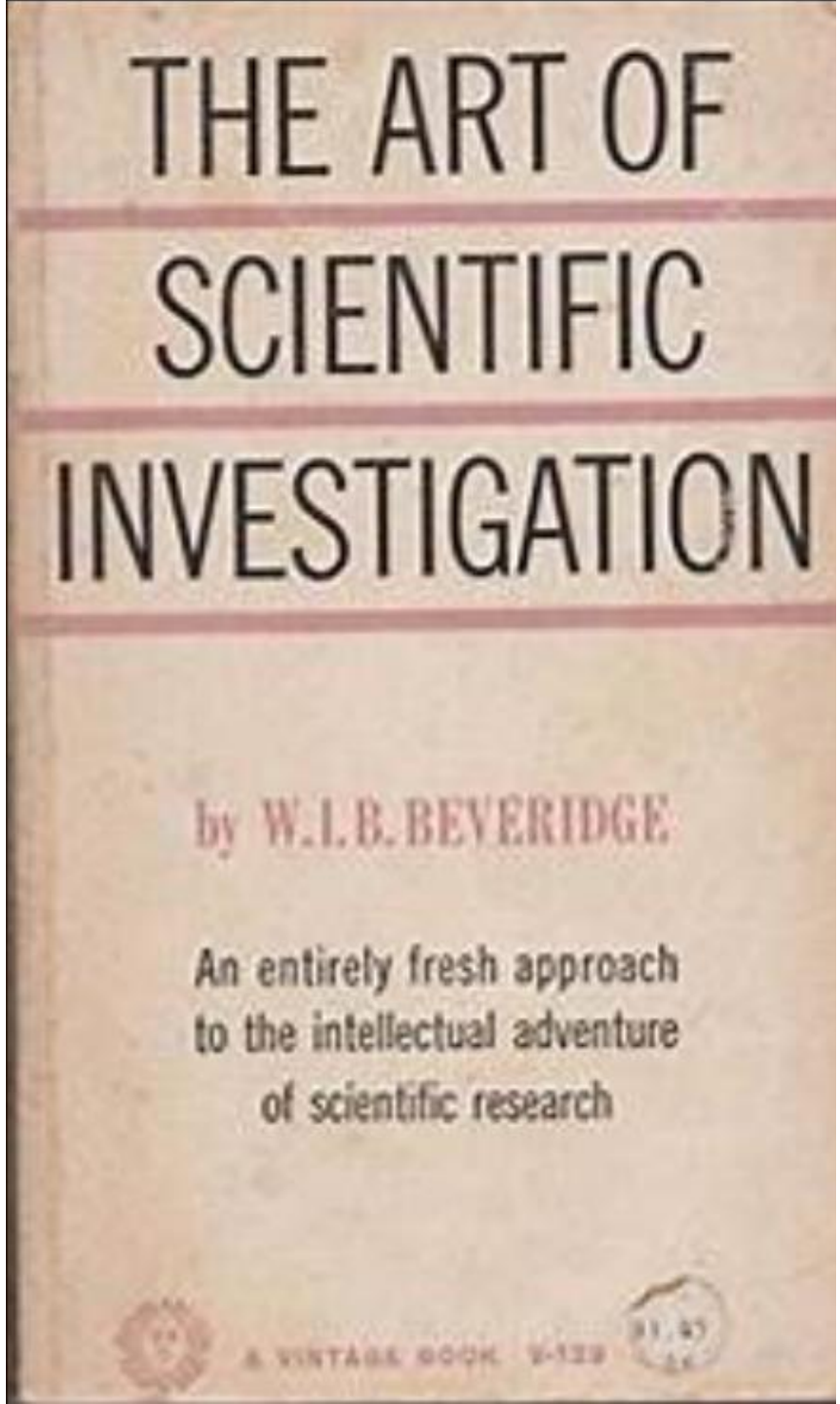
Follow

Summary of our editors' top tips:

1) Seek advice if needed
2) Resist an angry response
3) Revise your paper accordingly
4) Organise your letter
5) Stand up for your science
6) Don’t ignore comments
7) Don’t guess reviewer identities; you’re usually wrong!

“…a spirit of **indomitable perseverance** has characterized nearly all successful scientists”

In·dom·i·ta·ble. Meaning “impossible to subdue or defeat”

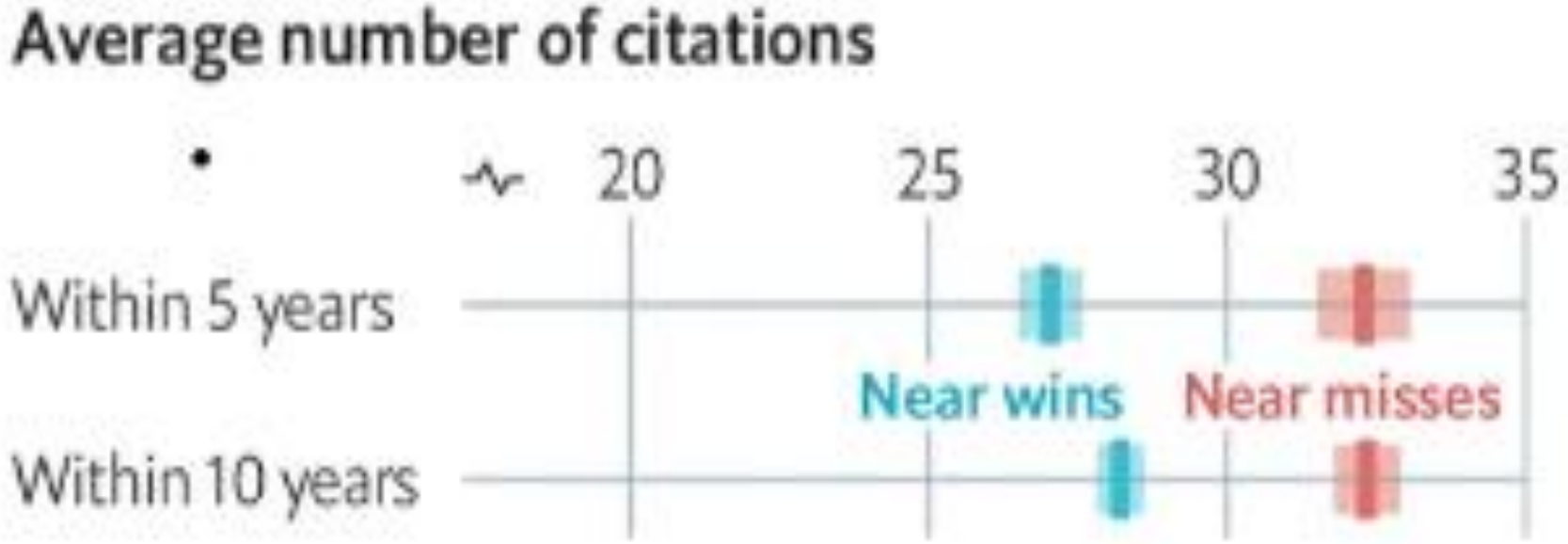


Earlier this year in *The Economist*

Daily chart

Success in academia is as much about grit as talent

New research says early failure in the sciences may be beneficial in the long run



“Progress = pain + reflection”

Ray Dalio

Michael White
@MWClimateSci

Follow

I've handled the review of > 1000 papers at @nature. Over time, you notice aspects of presentation on which reviewers tend to comment. In the interests of minimizing hassles during review, I offer the following suggestions (a bit targeted to climate papers).

4:34 PM - 29 Mar 2019

4,350 Retweets **9,807** Likes

100 4.4K 9.8K

A little secret *(especially the high impact papers)*

I do this
and this
and this
and this
and…

A must watch

YouTube CA

Search

Randy Olson Great Challenges Day at TEDMED 2013

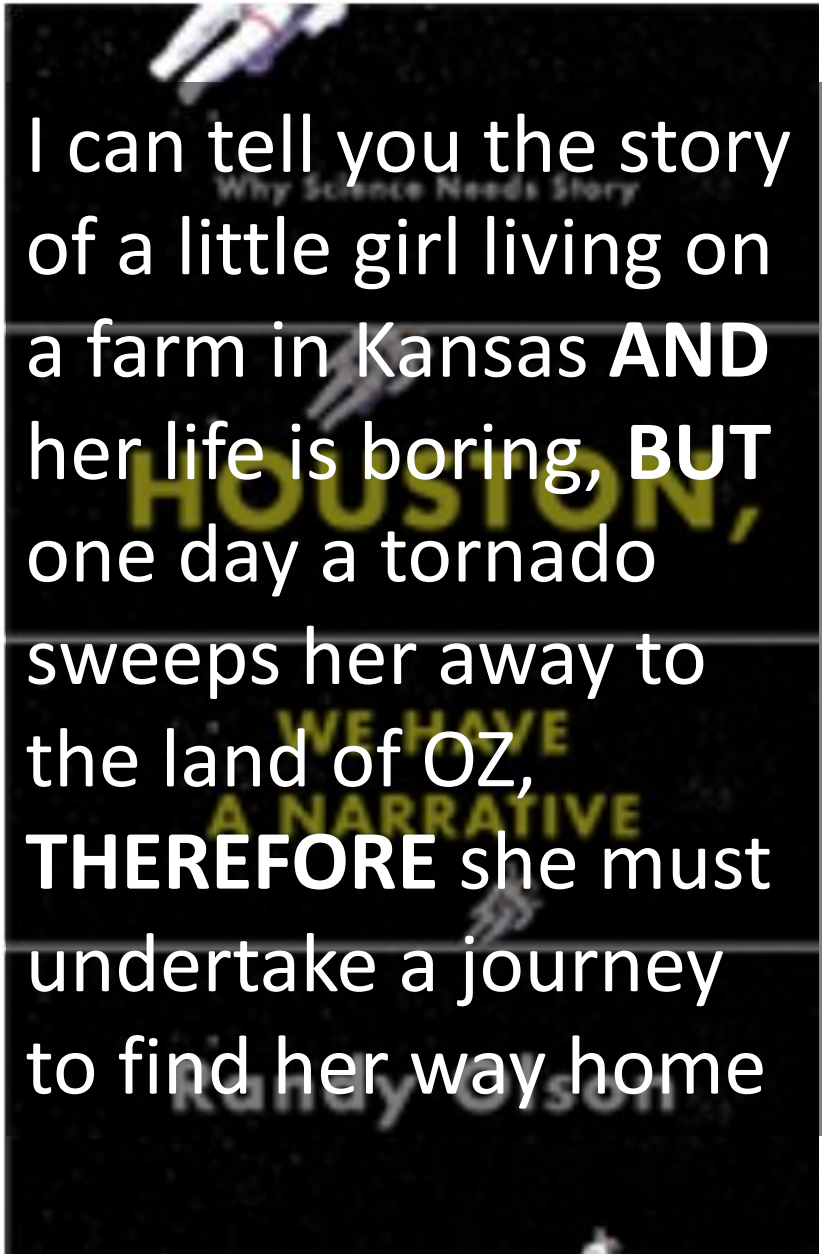
26,668 views

135 0 SHARE SAVE ...

How it's done:

"And"
"But"
"Therefore"

_____and,_____
but,_____
therefore_____.

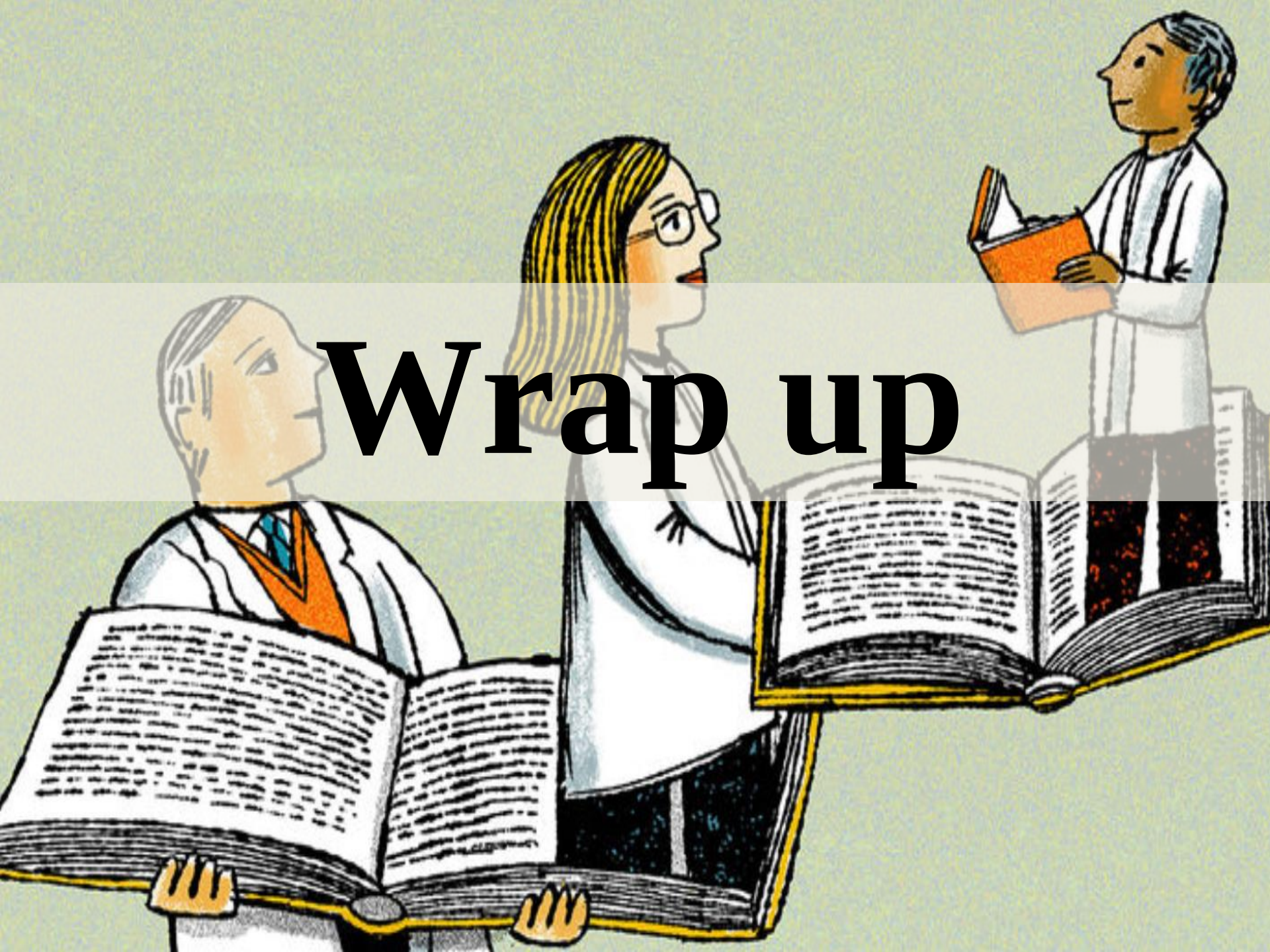


I can tell you the story of a little girl living on a farm in Kansas **AND** her life is boring, **BUT** one day a tornado sweeps her away to the land of OZ, **THEREFORE** she must undertake a journey to find her way home

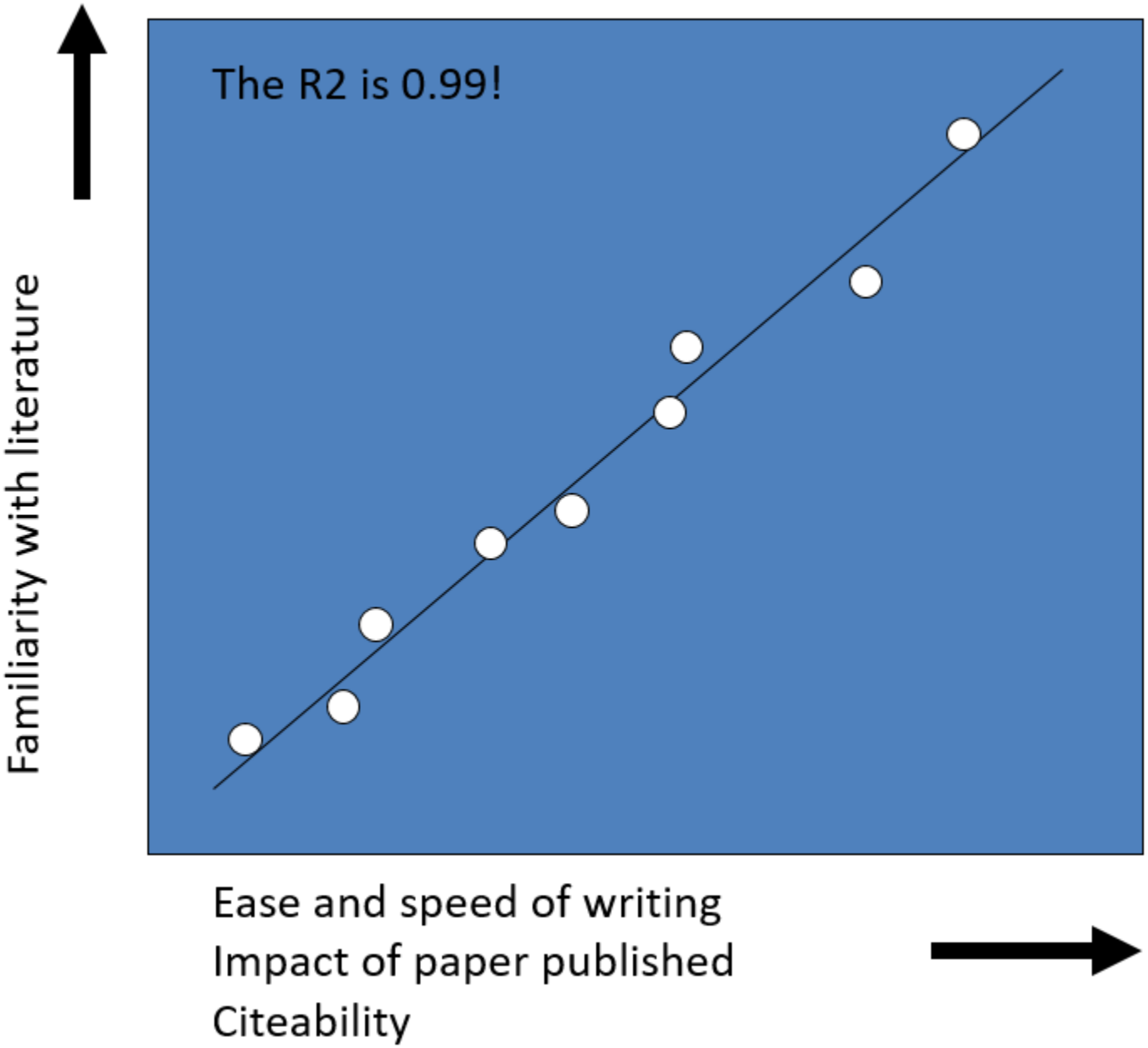
A great example…

kABT: In my lab we're studying sleep apnea using rats as our model system, AND we've been focused on physiological mechanisms, BUT lately we've realized the real controls may lie at the molecular level in the central nervous system, so AS A RESULT we've begun exploring novel molecular pathways.

Wrap up

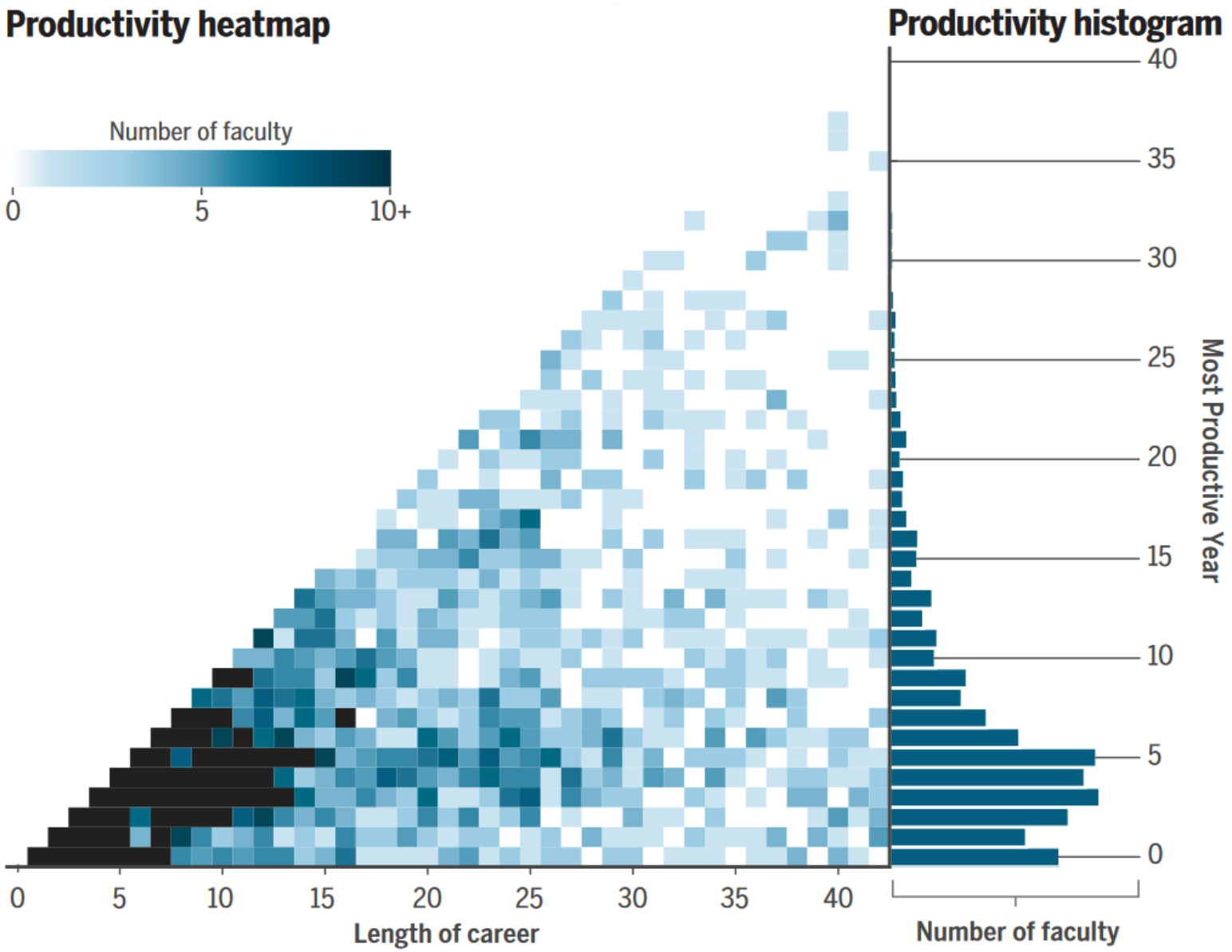


Perhaps the most important thing to know



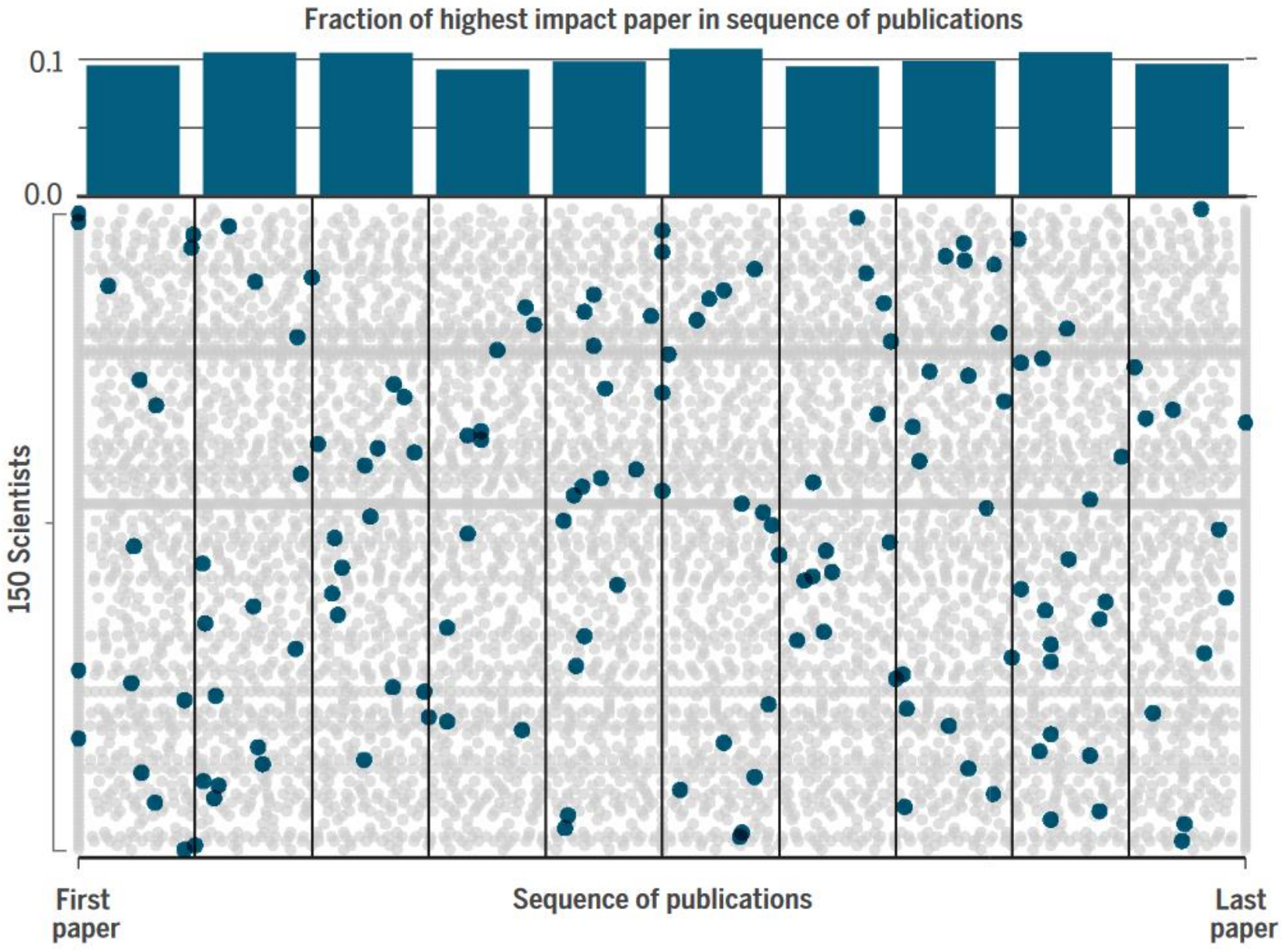
Now is your productive writing time!

Clauset et al., 2017 Science



…but for us old folks there is this!

Clauset et al., 2017 Science



Summary

and shameless advertising

-The **inspiration** behind papers
-The **art** of paper writing
-The **psychology** of dealing with reviewers and editors

A forthcoming book: