You and Your Research

&

The Elements of Style

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Logic Mentoring Workshop

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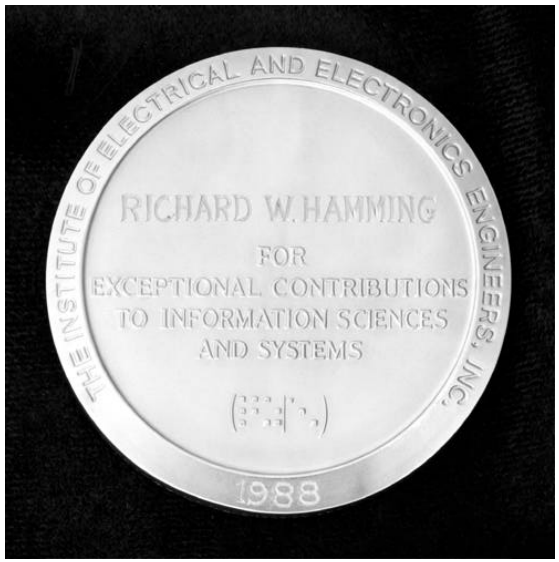
Part I

You and Your Research

Richard W. Hamming, 1915–1998

- Los Alamos, 1945.
- Bell Labs, 1946–1976.
- Naval Postgraduate School, 1976–1998.
- Turing Award, 1968. (Third time given.)
- IEEE Hamming Medal, 1987.



It's not luck, it's not brains, it's courage

> Say to yourself, 'Yes, I would like to do first-class work.' Our society frowns on people who set out to do really good work. You're not supposed to; luck is supposed to descend on you and you do great things by chance. Well, that's a kind of dumb thing to say.
>
> . . .
>
> How about having lots of 'brains?' It sounds good. Most of you in this room probably have more than enough brains to do first-class work. But great work is something else than mere brains.
>
> . . .
>
> One of the characteristics of successful scientists is having courage. Once you get your courage up and believe that you can do important problems, then you can. If you think you can't, almost surely you are not going to.

— Richard Hamming, You and Your Research

Develop reusable solutions

> How do I obey Newton's rule? He said, 'If I have seen further than others, it is because I've stood on the shoulders of giants.' These days we stand on each other's feet!
> Now if you are much of a mathematician you know that the effort to generalize often means that the solution is simple.
> I suggest that by altering the problem, by looking at the thing differently, you can make a great deal of difference in your final productivity because you can either do it in such a fashion that people can indeed build on what you've done, or you can do it in such a fashion that the next person has to essentially duplicate again what you've done.

— Richard Hamming, You and Your Research

Sell your work

> I have now come down to a topic which is very distasteful; it is not sufficient to do a job, you have to sell it. 'Selling' to a scientist is an awkward thing to do. It's very ugly; you shouldn't have to do it. The world is supposed to be waiting, and when you do something great, they should rush out and welcome it. But the fact is everyone is busy with their own work. You must present it so well that they will set aside what they are doing, look at what you've done, read it, and come back and say, 'Yes, that was good.' If they don't stop and read it, you won't get credit.
>
> — Richard Hamming, You and Your Research

Part II

The Elements of Style

Examples, examples, examples

> Jeff never saw a book with too many examples. Use lots. Even a very simple example will get three-quarters of an idea across. A page or two later you can refine it with a complex example that illustrates all the "grubbies." But finding good examples—examples that illustrate all and only the points you are concerned with—is not easy; Jeff has no recipe. You must be prepared to spend a lot of time on it.
>
> — Jeff Ullman on Getting Rich,
> in Knuth, Larabee, and Roberts

Express related ideas in related ways

the French, the Italians, Spanish, and Portugese	the French, the Italians, the Spanish, and the Portugese
My objections are, first, the injustice of the measure; second that it is unconstitutional.	My objections are, first, that the measure is unjust; second, that it is unconstitutional.
Formerly, science was taught by the textbook method, while now the laboratory method is employed.	Formerly, science was taught by the textbook method; now it is taught by the laboratory method.

— Strunk and White, *The Elements of Style*

Criticize yourself, not others

When you describe your own work, you should always emphasize its limitations.

. . .

Always emphasize the merits of the work of your predecessors and rivals.

. . .

Never claim to have remedied some defect or limitation in somebody's work. Point out how good somebody's work is and say I have just made a small improvement in this particular aspect of it. Then people will be on your side.

— Tony Hoare, Marktoberdorf 2006

Avoid non-referential this

> While it sounds pedantic at first, you get a huge increase in clarity by chasing the "nonreferential this" from students' writing. Many students (and others) use "this" to refer to a whole concept rather than a noun. For example: "If you turn the sproggle left, it will jam, and the glorp will not be able to move. This is why we foo the bar." Now the writer of this prose fully understands about sproggles and glorps, so they know whether we foo the bar because glorps do not move, or because the sproggle jammed. It is important for students to put themselves in the place of their readers, who may be a little shaky on how sproggles and glorps work, and need a more carefully written paragraph.

— Jeffrey D. Ullman, Advising students for success,
CACM 52(3):34–37, March 2009

Technical Writing

1. Symbols in different formulas must be separated by words.

   Bad: Consider S^q, $q < p$.

   Good: Consider S^q, where $q < p$.

2. Don't start a sentence with a symbol.

   Bad: $x^n - a$ has n distinct zeroes.

   Good: The polynomial $x^n - a$ has n distinct zeroes.

3. Don't use the symbols $\therefore$, $\Leftarrow$, $\forall$, $\exists$, $\ni$; replace them by the corresponding words. (Except in works on logic, of course.)

— Donald Knuth, Notes on Technical Writing

Omit needless words

Since the literature in this area is vast and varied, we have found the selection and organisation of these results to be a formidable task. We have chosen to simplify our task by restricting our attention to four major categories of results: shared memory algorithms, distributed consensus algrorithms, distributed network algorithms and concurrency control.

We restrict our attention to four major categories: shared memory algorithms, distributed consensus algrorithms, distributed network algorithms, and concurrency control.

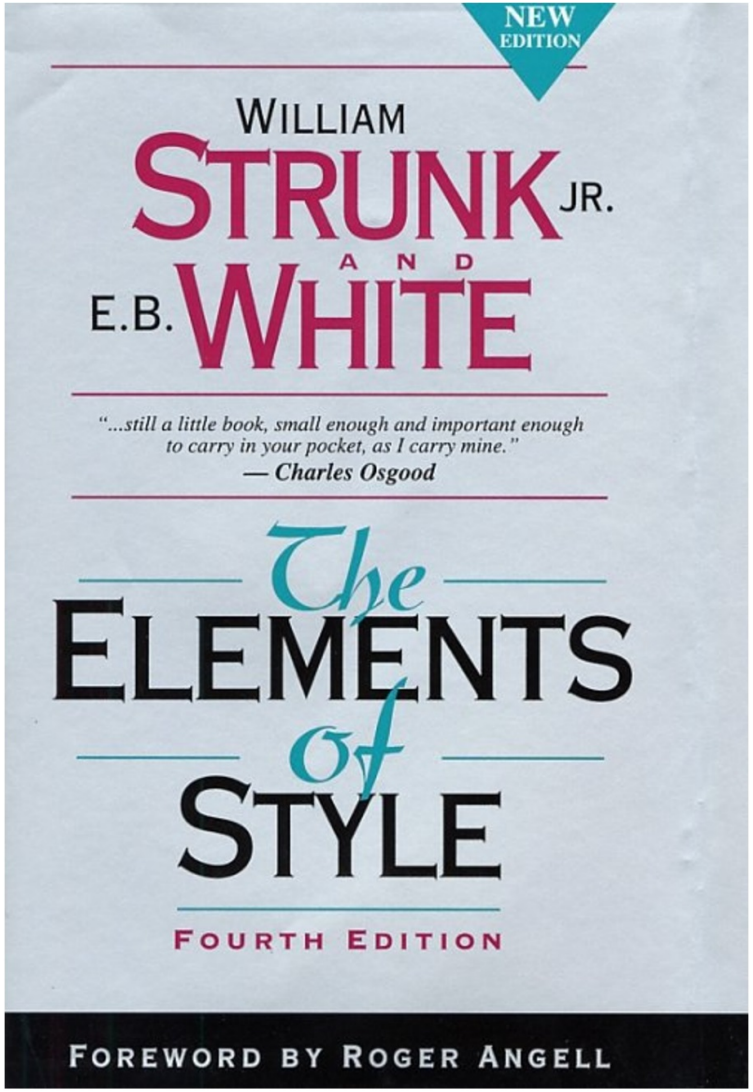
— Leslie Lamport, Handout on unnecessary prose,
in Knuth, Larabee, and Roberts

Study the masters

> Vigorous writing is concise. A sentence should contain no unnecessary words, a paragraph no unnecessary sentences, for the same reason that a drawing should contain no unnecessary lines and a machine no unnecessary parts. This requires not that the writer make all his sentences short or that he avoid all detail and treat his subjects in outline, but that every word tell.
>
> — Strunk and White, *The Elements of Style*

Part III

Conclusion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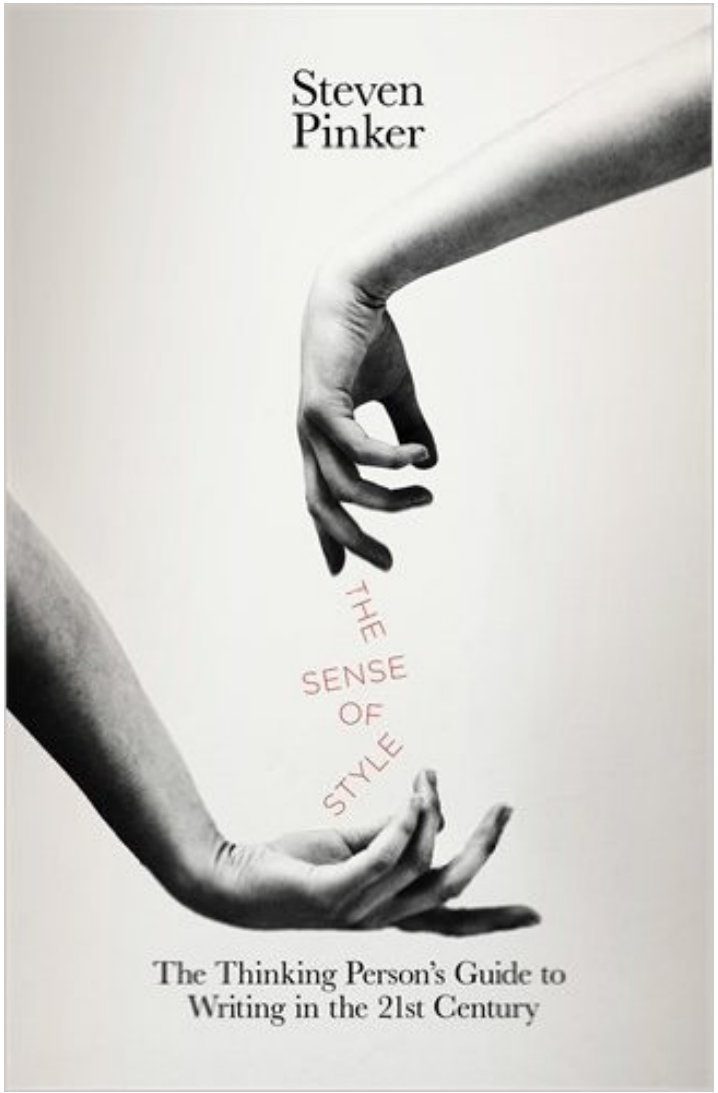
WILLIAM STRUNK JR.
AND
E.B. WHITE
"...still a little book, small enough and important enough to carry in your pocket, as I carry mine."
— Charles Osgood
The ELEMENTS of STYLE
FOURTH EDITION
FOREWORD BY ROGER ANGELL


Steven Pinker
THE SENSE OF STYLE
The Thinking Person's Guide to Writing in the 21st Century

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- George Orwell, "Politics and the English Language", in *Inside the Whale and Other Essays*, Penguin, 1969.
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- Any well written fiction or non-fiction.

You don’t need luck, but you are lucky!

The computer age is barely half a century old.

Computing has yet to find its Galileo, Kepler, or Newton.

It could be you!