When persuasion fails…

Persuasion in Technical Communications

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On January 28, 1986, the United States was shocked by the destruction of the space shuttle Challenger and the death of its seven crew members.

"The decision to launch the Challenger was flawed. Those who made that decision were unaware of the recent history of problems concerning the O-rings and the joint and were unaware of the initial written recommendation of the contractor advising against the launch at temperatures below 53 degrees Fahrenheit and the continuing opposition of the engineers at Thiokol after the management reversed its position. They did not have a clear understanding of Rockwell's concern that it was not safe to launch because of ice on the pad. If the decision makers had known all of the facts, it is highly unlikely that they would have decided to launch 51-L on January 28, 1986."—Report of the Presidential Commission on the Space Shuttle Challenger Accident*

For a highly informative and irreverent inside look at the Presidential Commission deliberations, read *What do you care what other people think? Further adventures of a curious character*, Richard P. Feynman (W.W. Norton & Co, New York, 1988).

Today, we'll look at the three components of persuasion, how to establish credibility in science writing, and the ethics of using persuasion in science.

"In science, the credit goes to the man who convinces the world, not to the man to whom the idea first occurs."—Sir Francis Darwin (Today, we would substitute "person" for "man," but that's not what Darwin, who was a product of a different place and time, said, and I believe people should be quoted accurately.—cme)

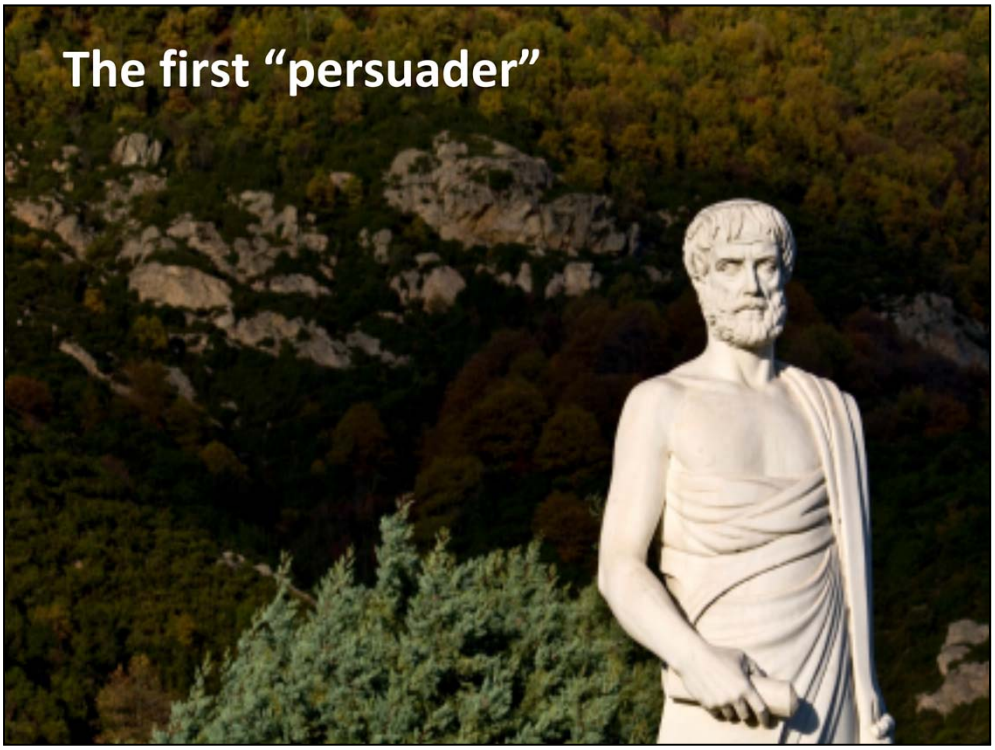
Research is not complete, no matter how many experiments have been conducted, no matter how many puzzles have been solved, until peers outside of a research team are ***persuaded*** that you've done something significant, your results are valid, and your conclusions are correct.

Persuasion is a social process and is an essential part of the creation, testing, and advance of scientific knowledge.

Persuasive skills are also important in leadership, teamwork, and other fundamentals of success in the scientific enterprise.

Success in science and engineering ***requires*** good persuasive skills.

As a scientist you will use persuasion:
- in scholarly papers.
- in reports and recommendations to superiors.
- in proposals to funders or customers.
- among team members in work groups.
- in directives to subordinates.



The Greek philosopher Aristotle (384 BC-322 BC) first laid out the basic tenets of persuasion nearly 2400 years ago in *The Art of Rhetoric*, wherein he elucidated the process of logical persuasive argument.

The three elements of persuasion:

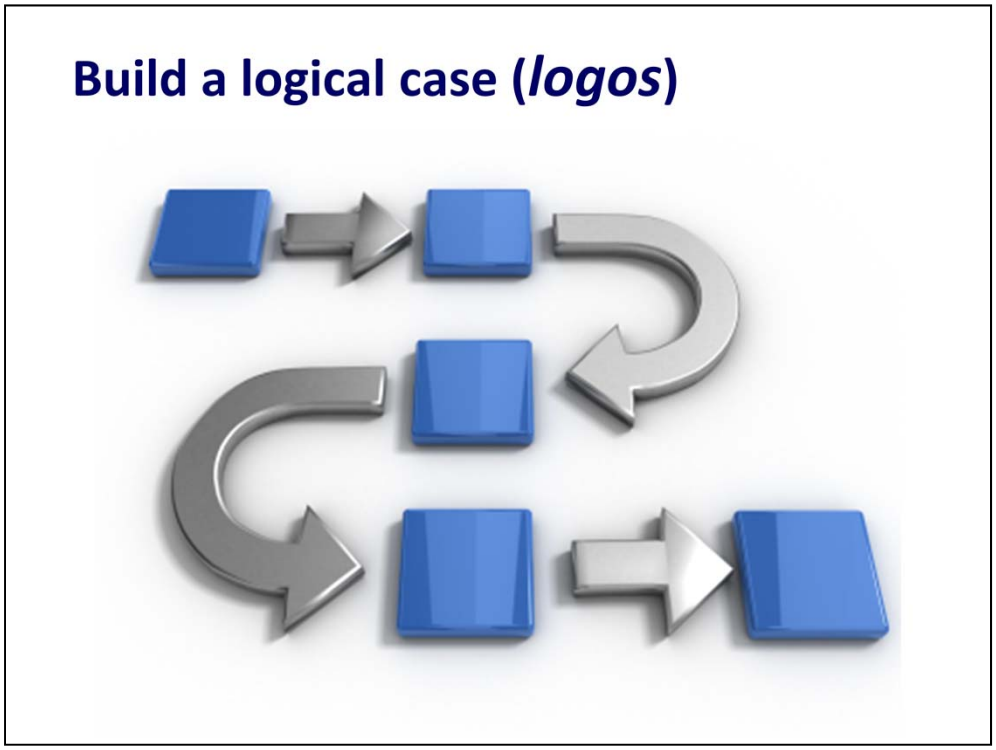
logos—logic, reason, fact

ethos—honesty, credibility, reliability

pathos—passion, emotion, enthusiasm

While we rely on logic and credibility in science, effective scientific communications incorporate all three elements.

“Pathos” here retains its original Greek meaning, viz. having an effect upon the emotions; exciting the passions or affections; moving, stirring, affecting—not *pathetic* but ***passionate***.



First, decide what conclusions you want your "audience" to reach—that the work you did was important, that the method you used was appropriate, that you actually measured what you think you measured, that your results are valid, your assumptions are sound, and your conclusions are supported by the evidence.

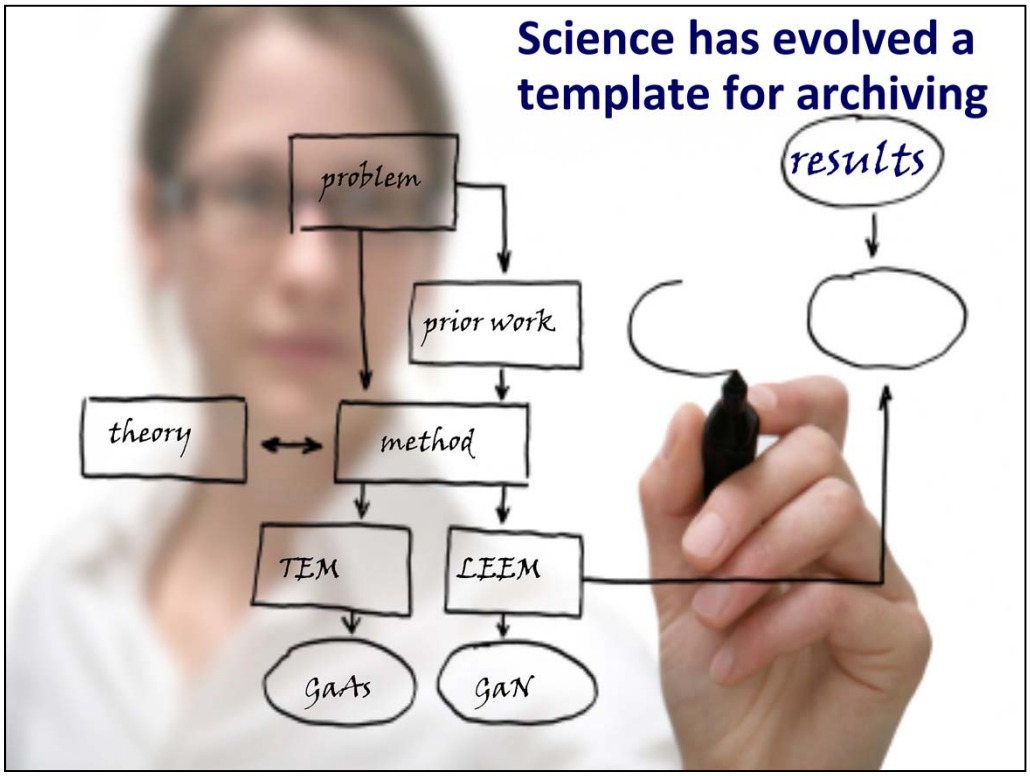
Make a list of all the important points that the audience must know.

Marshall supporting facts and explanatory information.

Arrange the main points and supporting details in a logical order, so that each moves the audience incrementally closer to the desired conclusion (outline!).

Think of the structure of your argument as a roadmap that is going to lead your reader to a predetermined destination. Create "sign posts" to guide the reader through your narrative.

"Sign posts" are reader cues such as graphical highlighting (boldface or italic), use of headings and subheadings, arrangement of text on the page, incorporation of figures and tables, and mathematical proofs.



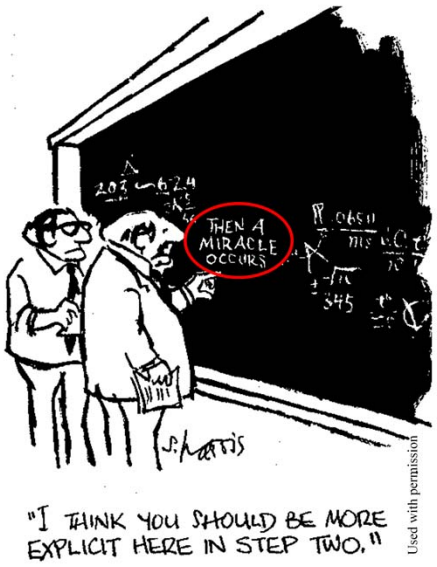
Science articles—and to a large extent, science talks—follow the same basic structure. Hew to it witlessly.

Title
Abstract
Background and Introduction
Technical Description
Results
Discussion
Conclusions
Acknowledgments
References
Special Sections, if needed

We'll go through each of these components during the course of the semester.

Build your logical arguments around this formal (and mandatory) structure.

Logical exposition reveals the relationship between data and ideas



Physicists tend to be highly skeptical about miracles.

Use precise, descriptive language.
State assumptions and inferences explicitly and provide supporting detail.
Arrange your narrative in a logical structure.
Provide transitional statements to tie ideas together.

Add authority to your arguments:

Establish your credibility by demonstrating your familiarity with the problem (background and introduction section).

Cite the work and opinion of experts (references).

Don't hide things (methods/procedure section).

Don't overstate your claims or force your data (results section).

Anticipate questions and objections and candidly discuss opposing views (discussion section).

Be candid about shortcomings, limitations, or weaknesses.

Increase your credibility by demonstrating your objectivity.

Neutralize objections by anticipating and answering them.

Evenhandedness is particularly important if your method or results are controversial.

Reciting "facts" is not sufficient (*pathos*)

Facts must be assembled into arguments.

Adapt to your audience; consider their level of understanding, preconceived notions, and motivation for reading or listening.

Scientists are suspicious about emotional appeals; temper your enthusiasm to what you can ***prove***, not what you believe.

Persuasion is powerful; use it judiciously and ethically

Go beyond the “don’t make things up” case.

Don’t distort the facts.
Don’t choose facts selectively.
Don’t exaggerate or give deceptive emphasis.
Don’t omit pertinent objections or counter-arguments.

And if you’re not persuaded...come talk to me!

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