MECH ENG 200: Writing the Abstract and Technical Paper

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Communication/Technical Skills

No matter how many technical skills you have, you still need to deal with people at a level they can understand, so communication skills are just as important as technical skills.

Paula Anthony, Industry technical support team leader

Earnings and English

A study reported in *Fortune* magazine showed that the top quartile in university studies earned three times what the bottom quartile earned in their lifetimes.

The best communicators among you will earn millions more over your lifetimes than the least effective communicators.

Genres

As you move through your career at U of A you will need to learn new genres

- Engineering genres:
  presentations, abstracts, reports

- Genres in course electives often include:

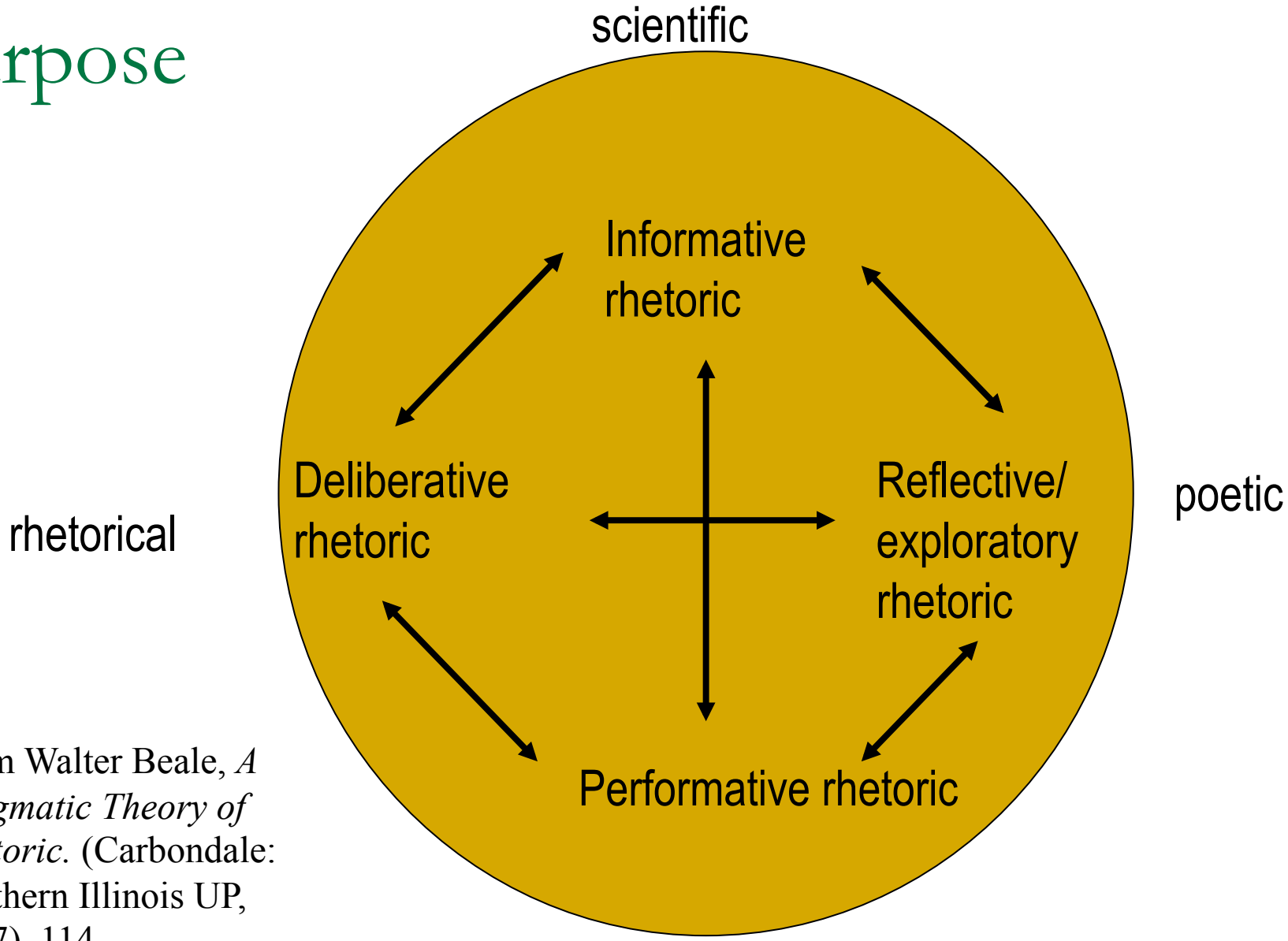
  essays, reflections, summaries, annotated bibliographies

Audiences

You will need to learn to write for distinctly different audiences:

- Co-workers in co-op placements
- Engineering professors
- Professors in elective courses
- Job search documents

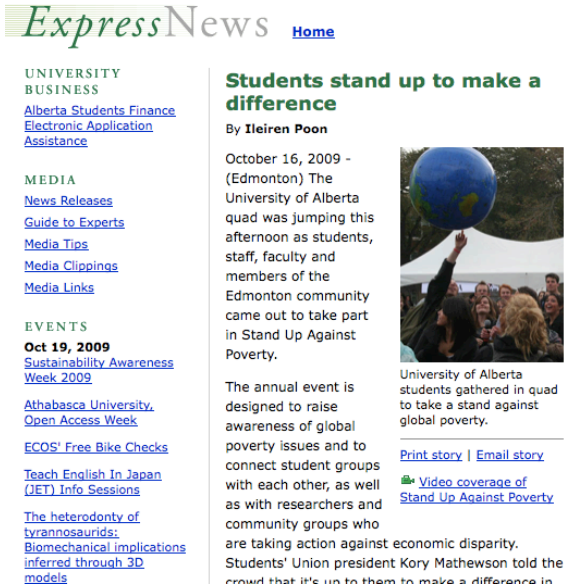
Purpose



From Walter Beale, *A Pragmatic Theory of Rhetoric*. (Carbondale: Southern Illinois UP, 1987), 114.

Purpose: The circular model

- Highlights the dual purposes of discourse
- A piece of writing can both persuade and inform (e.g. newspaper report on school lunches)
- Any piece of writing has at least two aims
- E.g Your resume
  - Informative and persuasive



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EVENTS

Oct 19, 2009
Sustainability Awareness Week 2009

Athabasca University, Open Access Week

ECOS' Free Bike Checks

Teach English In Japan (JET) Info Sessions

The heterodonty of tyrannosaurids: Biomechanical implications inferred through 3D models

Students stand up to make a difference

By **Ileiren Poon**

October 16, 2009 - (Edmonton) The University of Alberta quad was jumping this afternoon as students, staff, faculty and members of the Edmonton community came out to take part in Stand Up Against Poverty.

The annual event is designed to raise awareness of global poverty issues and to connect student groups with each other, as well as with researchers and community groups who are taking action against economic disparity. Students' Union president Kory Mathewson told the crowd that it's up to them to make a difference in

University of Alberta students gathered in quad to take a stand against global poverty.

Print story | Email story

Video coverage of Stand Up Against Poverty

5 Factors affecting success as a writer

1. Flexibility of your writing processes
2. Ability to get feedback on drafts
3. Familiarity with the genre, complexity of the genre
4. Complexity of the task (purpose): description is less complex than analysis/ synthesis
5. Number of audiences/readers, diversity within these groups

Success in this course

1. writing processes
2. feedback on drafts July 5
3. Familiarity with the genre—how many of these have you written this term? (unknown)
4. Complexity of the task (purpose): analysis/synthesis is at top end of reasoning skills (difficult)
5. audiences/readers—instructor (relatively easy)

Academic writing for engineering students

- Technical engineering documents
- Email to peers, professors, staff
- Job application materials
- Essays for non-engineering courses
- Lab reports for science courses

Audience and Purpose

- Understand your audience for a piece of writing
- Understand your purpose for a piece of writing
- The better you understand your audience and purpose, the better your document will accomplish your goals

Technical Paper

- Who is your **audience** for the technical paper?
  Describe this reader.
- What is your **purpose**?

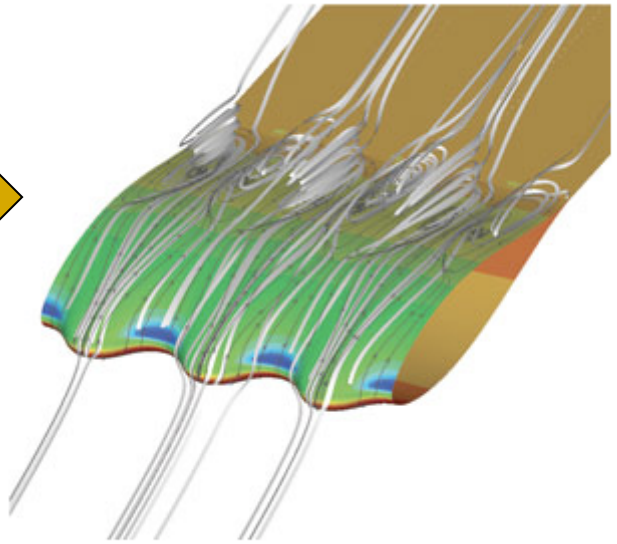
Drafting the paper

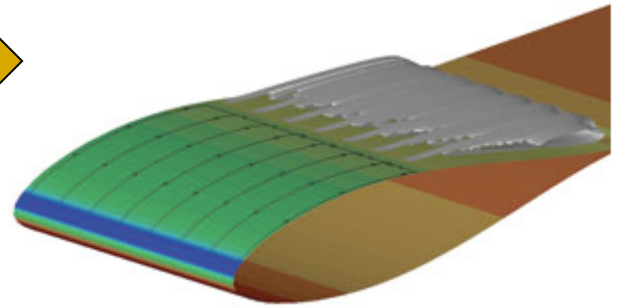
From Whales to Fans: ***A second look at a piece of sculpture led to a promising technology.***
By Alan S. Brown, Associate Editor

Assuming you were using this article as your ME Magazine source, how would you develop your technical paper?

- Frank Fish and a partner, Stephen Dewar, founded a company named Whale Power to market the technology, which takes its inspiration from the natural design of the bumps, or tubercles, on humpback whale flippers. According to Dewar, applying to airfoils what Fish and others learned from whales improves lift without increasing drag. He said that 24-foot-diameter fans based on tubercle technology use half the number of blades and move 25 percent more air and consume 25 percent less power than fans with conventional blades turning at the same speed. Whale-inspired fans are already available, and wind and tidal power blades could be next.

- a CFD model shows how leading edge bumps channel flow into the valleys where they meet counter-rotating flows coming off neighboring bumps. This energizes the flow so it hugs the airfoil as the angle of attack increases. Bottom, a model of an airfoil without bumps.





- The wind tunnel experiments enabled the team to develop CFD models that showed why tubercles delayed stall. They formed evenly spaced hills and valleys along the leading edge of the flipper. The rounded hills created vortices that they deflected into the valleys.

  Each valley was surrounded by two hills, and the vortices from each hill had opposite spins. When they mixed in the valley, they accelerated the flow of liquid to the back of the flipper. “It was like what happens in a pitching machine in a batting cage,” Fish said. “They have two large wheels spinning in opposite directions. When you put a baseball between them, it accelerates it very quickly.”

  Ordinarily, the airflow over an airfoil separates from the surface when the angle of attack rises above 11 or 12 percent. The vortices, on the other hand, energized the airflow so that it adhered to the surface all the way back to the trailing edge. The result was more lift and less drag.

- How is a technical paper different from a magazine article?

Organization

- Introduction
- Formulation of the problem
- Results
- Conclusion

Hints for summarizing

- Look in the article's Introduction for the question they are asking (in this case, paragraph 2)
- Look in the Results for the findings (in this case, the last paragraph of the Results)

Five Tips for Writing Abstracts

- Limit your use of technical language (jargon)
- Define essential technical terms (def)
- Include background information to give some context for your subject matter (backgd)
- Provide the details that connect your topic and its significance (details)
- Explain significance explicitly and clearly (you can't expect non-specialist readers to fill in any gaps)

A Slinky that Lights the Sky

NASA's polar satellite has revealed one of the power sources behind the gossamer glow of the aurora: Alfvén waves, oscillations in Earth's magnetic field that resemble the quivering of a Slinky toy. John Wygant of the University of Minnesota and Andreas Keiling of the Center for Space Research on Radiation in Toulouse, France, used Polar's instruments to study energy flowing along the lines of the geomagnetic field. "Field lines have a certain tension. Charged particles are tied to those lines, so when the field wiggles around, they wiggle too," Wygant says. Magnetic waves moving along those lines can catch electrons and accelerate them to speeds up to 30,000 miles a second. Eventually the particles crash into air molecules, giving up their energy in the form of the green, blue, red, and violet light of the aurora.

Wherever Keiling and Wygant detected a powerful electromagnetic wiggling, the associated field lines led down to a region of aurora. Polar's instruments also showed that the energy in each electron stream was proportional to the intensity of the display. Similar Alfvén waves may transport energy away from the surface of the sun, heating the solar atmosphere to millions of degrees.

- A. S. Brown. (2011, May). From Whales to Fans: A second look at a piece of sculpture led to a promising technology. *Mechanical Engineering Magazine Online*. Available: http://MEMagazine.asme.org/Articles/2011/May/From_Whales_Fans.cfm.
- Keywords: lift, drag, airfoils, aerodynamics, fluid dynamics, vortices

Sample Abstract

- “From Whales to Fans” describes the inspiration for a new technology that improves the performance of airfoils by improving lift without increasing drag. The technology resulted from the observation that humpback whale flippers have bumps on the leading edge, the edge that on airplane wings is smooth in order to produce a smooth, aerodynamic flow of air. Using 3-d models of the whale flippers, the authors were able to demonstrate through a variety of experiments that the tubercles improved lift and postponed stall. The vortices that developed as a result of the tubercles caused the airflow to adhere longer to the surface of the wing. When these principles were subsequently applied to fans and turbines, the results included less air stratification, higher efficiency through improved airflow, and lower costs (up to 20% savings).

Looking ahead: Drafts of reports

- Use the C4W as a resource to get feedback before handing in final drafts
- Work hard at developing broad writing skills to handle the challenges of writing at work and in academic settings