Tips for Making Scientific Posters

Source: The Craft of Scientific Presentations, Michael Alley
See also http://www.writing.eng.vt.edu/posters.html
Why a scientific poster?

One of the most common methods of disseminating scientific information at conferences!

- Allows one to convey more details than in a talk
- Provides an opportunity for more Q&A exchange between author and reader than a talk or paper
Key features of a scientific poster:

Must attract an audience:
- Prominent title
- Attractive figures (lots)
- Clean, open layout

Must quickly orient the reader to the key points

Should be logically arranged

Should contain all elements of a good research paper:
- Motivation/Background
- Procedures/Experimental
- Results/Analysis
- Conclusions
- Acknowledgments

Should have clearly labeled sections
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Cooling Effects of Dirt Purge Holes on the Tips of Gas Turbine Blades

Eric Couch, Jesse Christopher, Erik Hohlfeld, and Karen Thole

Gas turbine engines run better at higher combustion temperatures. At higher combustion temperatures, these engines generate more power and use less fuel. However, these temperatures are restricted by melting temperatures of the turbine blades downstream of the combustor (see Figure 1).

Dirt purge holes on turbine blade tips allow for higher combustion temperatures. Harmful hot gases from the combustor leak across the gap between the blade tip and the shroud (see Figure 2). Dirt purge holes expel foreign particles from the blade tip so that film cooling holes are not blocked.

The project goal was to find the film cooling effects of these dirt purge holes. To find the effects, we performed wind tunnel experiments with scaled turbine blades.

The wind tunnel was low speed and low temperature, and the blades, shown in Figure 3, were scaled at 12 times their normal size. To measure temperatures on the blade tip, we used an infrared camera. Tip gap sizes and amount of coolant flow from the dirt purge holes were both varied.

Tip size dramatically affected cooling. In Figure 5, the lateral averages of effectiveness plotted against normalized tip length show that tip size dramatically affected the cooling.

In summary, dirt purge holes provide cooling to the tip surface. While intended to remove dirt from the blade, dirt purge holes also provide cooling to the tip surface. This cooling is enhanced with a small tip gap as the dirt purge funnels the tip region near the leading edge with cool air.

Acknowledgments
The sponsor for this project was Pratt & Whitney.
Posters should have more description than a talk slide, less description than a paper.
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(Way) too much description:
How to get started:

Choose a poster layout

- vertical columns
- contrasting fields
- centered images w/ explanations
How to get started:

Sketch your organizational plan on paper
Write down the key ideas in each section
Identify the figures/results that best convey your ideas in each section
How to get started:

Make sure there’s a coherent “flow” in your sections

You’re telling a story, so make sure the reader knows where to start and end

http://www.owlnet.rice.edu/~cainproj/designing.html
How to get started:

Use lots of blank space around margins to define sections:

Dilute Gas Bose-Fermi Mixture

J. Goldwin, S. B. Papp, B. DeMarco, and D. S. Jin
JILA, NIST, and Physics Dept., University of Colorado, Boulder, CO 80309

Abstract
We report on a two-species magneto-optical trap (MOT) for the simultaneous cooling and trapping of the fermionic isotope $^7$Li and the bosonic isotope $^8$Rb. Thistraprepresents the first stage in an experiment to sympathetically cool a Bose-Fermi mixture to quantum degeneracy. The fermion population in the MOT is characterized. Future aspects of the experiment are discussed.

The Fermion Challenge
Quantum statistics hinder evaporative cooling at low temperatures.
- First successful solution: make your fermions different.
  - D. DeMarco and D. S. Jin, Science 281, 1793 (1999)
  - Second solution: sympathetic cooling.
  - J. Cavallaroli et al., unpublished.

The $^8$Rb - $^7$K System
Near-infrared trapping transitions allow the use of commercial diode lasers.
- Start evaporation with higher phase-space density (higher $N$, lower $T$).
- $^7$Li evaporation is simpler than $^8$Rb.
- Greater $^7$Li number gives higher $r_0$; greater degeneracy ($T_r$).
- New physics - laser-shape effects in ultracold collisions, phase separation, collective rotations, BEC/EGO superradiance, phonon exchange, Feshbach resonances ($T_r$).

The MOT Light Scheme
Traps on $F = 2$ and $F = 3$.
- Repump: $v_{pp} = 4.6$ GHz.
- Repump: $v_{pp} = 1.2$ GHz.

Laser Diode Current Modulation
- 3-beam (retroreflected) MOT.
- 4 cm diameter waist.
- 13 Gouy field gradient.

Two-Species MOT
- 5-beam (retroreflected) MOT.
- Up to 1000 W total power.
- 3 cm diameter waist.
- 13 Gouy field gradient.

This work was performed in the Quantum Optics Laboratory of the Department of Physics and Astronomy at the University of Colorado at Boulder, CO 80309.

Conclusion
We have simultaneously trapped and cooled a mixture of $^8$Rb and $^7$Li in a single magneto-optical trap. Numbers of $6 	imes 10^7$ and $5 	imes 10^7$, respectively, are obtained. Progress is new underway to sympathetically cool $^7$Li, quantum degeneracy via forced evaporation of $^8$Rb.

Courtesy B. DeMarco
How to get started:

Setting up PowerPoint:

Select “Page Setup” under File Menu
- Slides sized for: Custom
- Orientation of slides: Landscape
- Width of slides: 56 inches
- Height of slides: 28 inches
- Title: 90-120 pt, sans serif font
- Author: 48-60 pt. sans serif
- Headings: 70-80 pt. sans serif
- Main text: 36-40 pt. sans serif
Other tips: Text

Text and figures should be legible from 3-5 feet away: 36 pt. font size minimum!

Edit excessive text!! Poster should have roughly 20% text, 40% figures, 40% space

Use sans serif fonts: these fonts are more legible than serif fonts from a distance

Headings and other text having the same level of importance should be the same font size

Generally, putting information in “bullet” form, rather than in sentences, is better:

Original
The ideal anesthetic should quickly make the patient unconscious but allow a quick return to consciousness, have few side effects, and be safe to handle.

http://www.owlnet.rice.edu/~cainproj/designing.html

Revised
Ideal anesthetics should:
- offer quick sedation
- provide quick recovery
- have few side effects
- be safe to handle
Other tips: Color

Use color to define relationships between different areas of the poster.

Use color to create coherence and guide the reader through your poster.

DON’T overuse color…too much variation will distract from the substance of your poster.

DON’T use color arbitrarily – the reader expects color to mean something, so they’ll be confused if it’s arbitrarily applied.

DON’T use a distracting background, and make sure there’s sufficient contrast between the background and the text.

Beware shading of backgrounds…this sometimes doesn’t show up well when enlarged to full poster size.
Other tips: Figures

Make sure to label all figures with legible fonts and font sizes.

Include a brief caption for the figure, or explicitly refer to the figure in the text.

Make sure your images and figures are of sufficiently high resolution to be enlarged.

Make sure your figures advance the points you’re making in the text.

Use darker background for lighter figures/pictures, and a lighter background for darker figures/pictures.
Critique these posters:

What makes your CELLS tick?

Coordination of cell proliferation and cell-type specification in vertebrate embryos: the role of dynamic regulation of the cdc25 phosphatases.

Mercedes Barrutia, Damian Nogare, Mary Ellen Lane, Ph.D.

**ABSTRACT**

The generation of a multicellular embryo from a single-celled zygote requires coordinating cell proliferation with mechanisms that regulate cell-type specification and cell movement. It is therefore essential that the rate of cell proliferation is variable for different populations of embryonic cells and different developmental stages. Following early, rapid, synchronous cell divisions, dynamic spatiotemporal regulation of cell proliferation is observed. We are interested in the molecular mechanisms that produce this spatiotemporal control in the embryo of a vertebrate, the zebrafish Danio rerio. Due to its rapid development, large transparent embryos, and genetic tractability, zebrafish is the ideal vertebrate model for these studies. In all eukaryotic organisms, the cdc25 tyrosine phosphatase plays a major role in cell cycle progression via activation of Mitosis Promoting Factor (MPF). Most higher metazoan genomes contain more than one gene encoding cdc25 phosphatases. To determine whether dynamic transcription of cdc25 is an important mechanism for spatiotemporal control of cell proliferation, as is the case in the Drosophila embryo, we are isolating the zebrafish genes encoding cdc25 by PCR. We have identified the zebrafish cdc25A gene and examined its spatiotemporal expression in developing embryos in situ hybridization. Expression of cdc25A is observed in only a subset of proliferating cells of the developing nervous system and mesoderm. In some of these cells, namely the precursors of primary motor neurons (PMN) and retinal ganglion cell (RGC), expression appears to be restricted to the terminal axons. Future work will focus on analyzing the coordination of cdc25A transcription with the mechanisms that control differentiation of these cells, and on isolation and expression analysis of additional cdc25 genes.

**INTRODUCTION**

With knowledge of the cell cycle and its regulators in other experimental organisms, we may be able to discern how certain aspects of processes, morphogenesis and pattern formation, are regulated at a molecular level in the zebrafish. In early embryonic cells, the cell cycle is synchronous and consists of two phases: mitosis (M) and synthesis (S). A two-subunit phosphatase of Cdk and cyclin, known as Mitosis Promoting Factor (MPF), is responsible for the entry to Mitosis. At later stages, the cell cycle experiences a transition (mid-blastula stage) from maternal mRNA control to zygotic mRNA control, synchronous to asynchronous cell division, and entrance of G1 and G2 phase. According to research on Drosophila, the MPF for the progression through G2 phase is activated through steps of phosphorylation/dephosphorylation on the Cdk substrate (1) through tyrosine-15, and (2) through a particular set of enzymes, and (2) dephosphorylation of Thr 16 and Tyr 15 by an Cdc25 enzyme (called string) (Voet & Voet, 1995). Identifying Cdc25 in zebrafish will allow us to understand the cell-to-cell interaction occurring at the cell cycle for most higher metazoan genomes.

Please feel free to contact ala@brics.sdu.edu

**RESULTS**

Figure 1: Expression of the Cdc25 in the Retinal Ganglion Cells at the Terminal Mitosis Stage.

Figure 2: Expression of the Cdc25 in the Primary Motor Neurons at the Terminal Mitosis Stage.

Selected Sources:


Critique these posters:

Robust Repair of Polygonal Models
Tao Ju (tau@nmsu.edu), Department of Computer Science, New Mexico State University, Las Cruces, NM

Polygonal Models

- Polygonal models are most popular for representing 3D objects in computer graphics. They are created from:
  - 3D laser range scans (e.g., Minkowski's David, the Bunny, the Dragon).
  - Computer-aided design software (e.g., Maya, AutoCAD, 3dsMax, LightWave).
  - Other representations (e.g., industrial CAD models, medical MRI data, geological data).

- Polygonal models have wide applications:
  - Industrial design and manufacturing
  - Medical visualization and analysis
  - Scientific computation and simulation
  - Games, animated movies, virtual reality, ...;

Volumetric Approach

1. Scan conversion
   - Extracts the model as an octree grid and detects grid edges that intersect the polygons.
   - Only produces construction with no need to store the original mesh.
   - Use merging operations with integer operations for numerically stable and fast incremental data.

2. Sign generation
   - Constructs a dual surface on the octree by building one face for each grid edge that intersects the original model.
   - Detect edges on the dual surface shared by both number of faces, and remove them by adding subedges. The shaded dual surface is closed.
   - Build signs on the grid indicating inside/inside of the dual surface.

3. Contouring
   - Contouring is the process of generating polygons that approximate the contour surface of a signed volume.
   - Marching Cubes can be used for generating closed, watertight model.
   - For CAD models, dual contouring can be used for generating a closed model with preserving sharp edges and corners.

Examples

1. Repairing gigapixel laser-scanned models (e.g., mesh models, with holes, hats, etc).

2. Repairing CAD models (with isolated triangles)

3. Repairing random models

Model Repair

- Goal: given an arbitrary polygonal model, generate a closed model that approximates the original geometry.

- Why do we need this?
  - Today's polygonal models are often broken - over millions of triangles
  - Many models can be very complex - gaps and complex holes
  - Multiple intersections - isolated polygons, etc.

- Repair should not have any geometric features - sharp edges and corners in CAD models.

What has been done?

- Point-based method - polygonal information lost
- Polygon-based method - not enough guarantees on correctness
- Volumetric method - hard with large mesh and complex error

3D Illustration

- Scan conversion
- Contouring
- Sign generation

Highlights

- Robust: closes arbitrary polygonal models
- Efficient: repairs gigapixel models on PCs
- Accurate: preserves geometry features

Acknowledgements

Special thanks to the Stanford Graphics Laboratory for the various models including the bunny, the horse, and the Stanford. Thank you also to the authors for providing the repair software. Finally, I want to give heartfelt thanks to my advisor, Tao Ju, for his continuous support and insightful comments.
Critique these posters:

Were Victorian Fallen Women Doomed?

The Question of REINTEGRATION

Could a Victorian woman ever transform from a Fallen Woman into a Respectable Matron?

The Common View

- Fallen women never reintegrated
- Fallen women were silent, passive victims
- Fallen women were legal victims
- Fallen women were ignored
- Fallen women were oppressed

Methodology

The research examines the experiences of fallen women in British and Irish societies. The study draws on primary sources, such as letters, diaries, and newspaper articles, to provide insights into the lives of fallen women.

Special Thanks

Professor Robert L. Press, Rice University
Professor John Belcher, University College London
Professor Helene Miller, Rice University
Rice Undergraduate Scholars Program
The British Library
The William Tellus Trust Library

Selected Sources


Challenges from MY RESEARCH

- Victorian authors depicted women marrying after a sexual fall
- Fallen women depicted contrasting characters
- Fallen women depicted in romantic contexts
- Fallen women depicted as victims
- Fallen women depicted in a positive light

Reform Shelters: A Different Perspective

- The work of reformers such as Florence Nightingale
- The establishment of reformatory schools
- The creation of charity organizations
- The provision of education and training programs

Conclusion

The research highlights the complexity of the Victorian fallen woman's experience. The study provides a comprehensive understanding of the social and cultural factors that contributed to the fallen woman's plight and offers insights into the role of personal agency in shaping their lives.

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Critique these posters:

**VITAMIN C: THE MULTIFUNCTIONAL ANTIOXIDANT**

**BACKGROUND**

Vitamin C (Ascorbic Acid) is an essential nutrient discovered in 1932 by Albert Szent-Györgyi, who isolated the antiscorbutic factor as pure crystalline material from lemon juice. In the past 25 years, much of the vitamin’s biochemical functions have been elucidated, including vitamin C in the treatment of viral infections, diabetes, and even cancer prevention. Today, scientists’ growing knowledge of ascorbic acid uncovers the significance of its antioxidant property, making its organic synthesis one of high demand for research and public consumption.

**ANTIOXIDANT PROTECTION**

- Stability of antioxidant free radicals
- Resonance delocalization
- Further oxidation of antioxidant radicals
- Reduction of radical species

**REACTION MECHANISMS**

**Antioxidant Radical Formation**

\[ \text{R}^* + \text{AH} \rightarrow \text{RH} + \text{A}^* \]

\[ \text{RO}^* + \text{AH} \rightarrow \text{ROH} + \text{A}^* \]

\[ \text{ROO}^* + \text{AH} \rightarrow \text{ROOH} + \text{A}^* \]

**Radical Chain Termination**

\[ \text{R}^* + \text{A} \rightarrow \text{RA} \]

\[ \text{RO}^* + \text{A} \rightarrow \text{ROA} \]

\[ \text{ROO}^* + \text{A} \rightarrow \text{ROOA} \]

**ANTIOXIDANT RADICAL STABILITY**


**ORGANIC SYNTHESIS OF VITAMIN C**

**Acid Catalyzed Acetalization**

**Oxidation**

**Acid Hydrolysis**

**Vitamin C**

**[Ascorbic Acid]**

**BIOLOGICAL BENEFITS**

- Defense against common cold
- Collagen formation
- Absorption of inorganic iron
- Metabolism of folic acid, amino acids, and hormones
- Protection of DNA, cell membranes, and critical molecules from radicals

**BIOSYNTHESIS**

**CHEMICAL FUNCTIONS**

**Antioxidant**

- Hydrogen donation to lipid radicals
- Removal of molecular O
- Quenching of singlet O
- Regeneration of tocopherol radicals

**Prooxidant**

- Reduction of Fe^{2+} to Fe^{3+}

**OXYGEN SCAVENGER**

**DESIGNER VITAMIN C**
Critique these posters:
Critique these posters:

**Practical Robust Localization over Large-Scale 802.11 Wireless Networks**

Andrew Haeberlen  
Eliot Flannery  
Andrew M. Ladd  
Algis Rudys  
Dan S. Wallach  
Lydia E. Kavraki

**Contact:** Andreas Haeberlen - DH3001 713-348-3726 ahae@cs.rice.edu

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1. **What does it do?**
   - Our technique uses Wireless Ethernet to determine the location of a mobile device (PDA, Notebook) in a building.

2. **Why use it?**
   - **Navigation:** Visist tourist guides
   - **Advertising:** Location-aware ads
   - **Robotics:** Help robots navigate
   - **Security:** Find wireless trackers
   - **Asset tracking:** Warehouses etc.
   - GPS does not work indoors!
   - Wireless Ethernet is widely available!

3. **How good is it?**
   - **Accurate:** Finds the correct room in more than 95% of all attempts!
   - **Good failure modes:** Incorrect results are almost always in adjacent rooms.
   - **Robust:** Works with different hardware and in changing environments.
   - **Fast:** Result available in seconds, can even track moving users!

4. **What’s new?**
   - **Much lower training time** than previous techniques (hours, not days!)
   - **Calibration technique** to compensate for hardware/environment changes.
   - **Better robustness** due to Gaussian signal model.
   - **Topological localization** combined with Markov localization.

5. **How does localization work?**
   - **Training:** Collect signal strength measurements in the entire building. This needs to be done only once.
   - **Topological regions**:
     - Location estimate $\hat{z}$
     - Observed signal strength $s$
     - Bayes’ formula $P(G|s) \hat{z}$
     - New location estimate $\hat{z}_{new}$
   - **Localization**: Device measures signal strength of all base stations in range and uses Markov localization to update its location estimate.

6. **How does calibration work?**
   - **Problem:** Reported signal strength values are different for different hardware, and can change over time.
   - **Solution:** Approximate the mapping from “old” values to “new” values by a linear function. Apply inverse function to each observation before giving it to the localizer.
   - **Parameters** can be estimated automatically, or by collecting a few measurements at a known location.

7. **How does tracking work?**
   - **Use Markov chain to model user movement**, and update location estimate after each iteration.
   - **Markov chain** encodes knowledge about topology.
   - Cannot move through walls, jump through ceilings.
   - **Result:** Excellent accuracy up to speeds of 3.4 m/s, with one location update every 1.6 seconds.
Informal Homework Assignment

- Go to the “classroom corridor” on the first floor of Loomis to check out the Senior Thesis posters
  - look at and critique the posters you see
  - which ones are most effective?
    - capture your interest
    - easily navigable
    - etc., etc.
  - What features of posters you see should you avoid?