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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Not so good!
Posters should have more description than a talk slide, less description than a paper.

Too little description:

Improving the Cooling of Blades and Vanes in Gas Turbine Engines
Professor K. A. Thole
Virginia Tech Experimental and Computational Convection Laboratory

To increase efficiency, gas turbine engines have to run at higher temperatures.

Jet engines: Power turbines: However, higher combustion temperatures reduce the life of the blades and vanes.

Better cooling schemes can dramatically affect the life of blades and vanes in gas turbines.

Our laboratory studies cooling schemes through experiments and computations.

Results from our studies are helping sponsors design better gas turbine engines.

Wind Tunnel Experiments

Without Fillet: Unwanted Vortices

With Fillet: Vortices Reduced

In summary, we are improving the cooling of blades and vanes in gas turbine engines.
Posters should have more description than a talk slide, less description than a paper

(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

- Title
- Authors & Affiliations
- Intro/Motivation
  - main point #1
  - main point #2
- Background
  - main point #1
  - main point #2
- Results
  - main point #1
  - main point #2
  - main point #3
- Analysis
  - main point #1
  - main point #2
- Conclusions
  - main point #1
  - main point #2
- Acknowledgments
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:
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
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.

Revised

Ideal anesthetics should:

- offer quick sedation
- provide quick recovery
- have few side effects
- be safe to handle

http://www.owlnet.rice.edu/~cainproj/designing.html
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-cell 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 embryos 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 phosphatases play 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 embryos, 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 by 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 axon. 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 phosphoprotein of Cdc2 and cyclin, known as Mitosis Promoting Factor (MPF), is responsible for the entry to Mitosis. At later stages, the cell cycle experiences a transition (mit-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 flies, the MPF for the progression through G2 phase is activated through steps of phosphorylation/dephosphorylation on the Cdc2 subunit: (1) phosphorylation at Thr15 (Thr161), Tyr15, and Thr210 by a particular set of enzymes, and (2) dephosphorylation of Thr14 and Tyr15 by a 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.

METHODS:

to isolate cdc25, I made primer pairs from an expressed sequence tag (EST), which is homologous to cdc25. Then I was able to clone Cdc25 from cDNA library (of zebrafish) through PCR reaction and expression vectors. After isolation, I determined when and where the gene is expressed through in-situ hybridization.

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 (tju@rice.edu), Department of Computer Sciences, Rice University, Houston, TX

Polyhedral Models
Polyhedral models are most popular for representing 3D objects in computers. They are created from:
- 3D laser range scans (e.g., Microsoft’s Shape3D, Logitech’s Cyclone)
- Computer-aided design softwares (e.g., Maya, AutoCAD, 3DS MAX, Rhinoceros)
- Other representations (e.g., industrial CAD models, medical MRI data, geological data)

Polyhedral models have wide applications:
- Industrial design and manufacturing
- Medical visualization and analysis
- Scientific computation and simulation
- Games, animated movies, etc.

Closed Models
Many applications (e.g., rapid prototyping) require a closed model with well-defined edges and vertices.
- The model partitions the space into distinct external and internal volumes
- Each polygon face lies on the boundary between an external volume and an internal volume

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

Why do we need model repair?
- Today’s polygonal models are often gigantic: over millions of triangles
- Errors in models can be very complex: gaps and complex holes, self-intersections, isolated polygons, etc.
- Repair should not alter geometry features: sharp edges and corners in CAD models

What have we done?
- Patch-based method: polygonal information is lost
- Patch-based method: cannot guarantee correctness
- Volumetric method: hard with large mesh and complex errors

Volumetric Approach

1. Scan conversion
- Extract the model in an octree grid and detect grid edges that intersect the polygons.
- Use ray-trace software with no need to store the original mesh.
- Use marching cubes, with integer operations for numerically stable and fast reconstruction.

2. Sign generation
- Construct a dual surface on the grid by building one face for each grid edge that intersects the original model.
- Detect edges on the dual surface shared by still more than one face, and remove them by adding vertices. The modified dual surface is closed.
- Build signs on the grid indicating inside/outside of the dual surface.

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

Examples

1. Repairing gigapixel laser-scanned models (3D models triangle, with bones, bone 3D mesh 632 MB)
2. Repairing CAD models (with isolated triangles)
3. Repairing random models

3D Illustration

Scan conversion

Sign generation

Contouring

Figure 1: Original model with an open loop
Figure 2: Model repaired
Figure 3: Dual surfaces on the grid
Figure 4: Closed dual surface (closed)

Highlights

Robust: Closes arbitrary polygonal models
Efficient: Lowers 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 Bunny for providing the test models. Finally, I would like to give heartfelt thanks to my advisor, Joe Warren, for his continuous support and helpful 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 re-integrated
- Victorian authors depicted women marrying after a sexual fall
- Fallen women were silent, passive victims
- Reformers sheltered oppressed fallen women

**Methodology**
The paper examines the transformation of fallen women in both literary and historical accounts. It considers Victorian depictions of fallen women, the small number of women reformed in the long term, and the success of some centers such as the Foundling Union in London.

**Special Thanks**
- Professor Robert L. Patmore, Rice University
- Professor John Sutherland, University College London
- Professor Juliette Mitchel, Rice University
- Rice Undergraduate Scholars Program
- The British Library
- The William's Trust Library

**Selected Sources**
- "The Reform of Fallen Women: A Different Perspective" by Assistant Professor Laura J. Gardiner, Rice University.
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, inducting vitamin C to 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
  \[ R^* + AH \rightarrow RH + A^* \]
  \[ RO^* + AH \rightarrow ROH + A^* \]
  \[ ROO^* + AH \rightarrow ROH + O + A^* \]
- Radical Chain Termination
  \[ R^* + A \rightarrow RA \]
  \[ RO^* + A \rightarrow ROA \]
  \[ ROO^* + A \rightarrow ROA + O \]

**Antioxidant Radical Stability**

**Organic Synthesis of Vitamin C**
Acid Catalyzed Acetalization

**Chemical Functions**
- Antioxidant
  - Hydrogen donation to lipid radicals
  - Removal of molecular O
  - Quenching of singlet O
  - Regeneration of tocopherol radicals
- Prooxidant
  - Reduction of Fe^{3+} to Fe^{2+}

**Biosynthesis**

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

**Oxygen Scavenger**

**Designer Vitamin C**

**Images and Diagrams:**
- Molecular structures and reactions relevant to vitamin C's properties and synthesis.
Critique these posters:
Critique these posters:

**Practical Robust Localization over Large-Scale 802.11 Wireless Networks**
Andreas Haeberlen, Eliot Flannery, Andrew M. Ladd, Algis Rudyks, Dan S. Wallach, Lydia E. Kavraki
Contact: Andreas Haeberlen · DH3001 · 713-348-3726 · ahae@cs.rice.edu

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:** Visit tourist guides
   - **Advertising:** Location-aware ads
   - **Robots:** Help a robot navigate
   - **Security:** Finds wireless intruders
   - **Asset tracking:** Warehouses etc.
   - GPS does not work indoors.
   - Wireless Ethernet is widely available.

3. **How good is it?**
   - **Accuracy:** 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 $\hat{p}$
     - $P(G_i|\hat{p})$ for $i=1,2,3$...
     - Signal map
     - Bayes' formula
     - New location estimate $\hat{p}$
   - **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?