Presentation Skills Workshop

Dr. Alan Grossfield
Learning objectives

- **How to give effective scientific presentations**
  - Focus on talks
    - Many lessons applicable to posters as well
  - Focus on slides

- **What you’ll learn**
  - Principles and rules of thumb
  - Specific techniques
Principles

- Know your audience
- Make it easy for them
- Master your tools
Know your audience

- It’s not what you say, it’s what they hear
  - Goal is to communicate ideas

- Think about the audience
  - What do they know?
  - What will interest them?
  - What’s the story?

- Detail vs. clarity
  - Will precision increase or decrease understanding?
  - Telling less might teach them more
How much detail?

- Talks are mostly about broad strokes
- Is the method the message?
  - Put time where it’s most valuable
- Is the technique familiar to the audience?
  - How to explain it?
  - Rigor vs. clarity
  - THERE IS NO ONE RIGHT ANSWER
- Strategies
  - Extra slide with more details, skip unless questioned
  - Detail in speaker notes
What does the audience expect?

- **Anticipate questions**
  - Pose a question, then answer it
  - Prepare extra slides if need be
  - You’ll still get caught by surprise sometimes

- **How to present data**
  - Some figures are expected
    - Even if not optimal, people expect to see them
Principles

- Know your audience
- Make it easy for them
- Master your tools
Listening to talks is hard

- Understanding science requires focus
- Most people won’t give it to you unless you help
- What can you do?
  - Make slides simple and readable
  - Use consistent visual grammar
  - Tell the audience why you’re telling them
  - Give them chances to get un-lost
Guide audience expectations

- **Outlines set up where you’re going**
  - Repeat the outline periodically
  - Give viewer chance to get “un-lost”

- **Good slide titles let them know your intentions**

- **Don’t assume it’s obvious**
  - Help them look at the right thing
  - Show don’t tell
Simple and readable

- Large fonts
- **Contrasting colors**
  - Check on a projected screen
- **Sparse text**
  - Listening, not reading
  - You’re giving the talk, not your slides
Readable plots

- **Very different from papers**
- **Multi-panel figures usually bad**
  - Show one panel at a time, or remake
  - If you need to compare, do it in stages
    - Show Panel A, then B, then both
- **Axis labels and units must be readable**
- **Use color effectively**
Complex plots are hard

- Complex figures are hard
  - Hard to know what to look at with 5 curves
  - Especially true with unfamiliar plots

- Make it easier by doing it piecewise
  - Show 1 curve, discuss features
  - Add other curves after
  - Add only what you’re discussing
Bad plot

- Too many curves
  - What is focus?
- Lines are thin and hard to see
Better

- Lines thicker
- Added line at y=1
- Bigger fonts
Better still: multiple slides

- Audience unfamiliar with RDF
  - Use plot with 1 curve to explain features
Better still: multiple slides

- Use plot of 2 to make comparison
- Third plot to compare the other curves
Each slide has 1 message

- **Put on slide exactly what you need for that message**
  - Extra info is distracting
  - Warning signs
    - “You can ignore ….”
    - “You don’t need to read …”

- **Slides are free**
  - Talks are different from papers

- **Builds / Animations vs. Multiple slides**
  - Builds can be useful if there’s lots of stuff on the slide
  - Also makes it harder to make and maintain the slides
Multipanel plots are evil

- Make things too small to see
- Excuse: “I don’t have time for more slides”
  - 5 simpler slides can be faster than 1 complex one
Lipid binding causes concerted structural changes

Too hard to read
People won’t know where to look

FIGURE 5 Direct DHA-rhodopsin interactions: side chains of the DHA acyl chain and protein residue F212 in one of the dark-state trajectories. (b) Time series of the $\chi_1$ torsion angle of F212 computed from the same dark-state trajectory as in (a). (c–e) Retinal methyl orientations as a function of simulation time computed from the same trajectory as in (a) and (b): (c) C5 methyl (C5-C18), (d) C9 methyl (C9-C19), and (e) C13 methyl (C13-C20). Right column: Time-stills showing rhodopsin viewed from the intradiscal side of the membrane in cartoon representation (only TM segments are shown for clarity). K296 and retinal are shown in stick representation. An SDPE phospholipid is drawn in sphere representation. To see this figure in color, go online.
Is Retinal Orientation Altered by Protein-Lipid Interactions?

- Methyl orientations with respect to membrane normal
- Retinal orientation is concurrently altered with side-chain reorientation

- C18
- C9
- C19
- C20
- C5
- C13
Poison Primer Extension of SUP4oc TS Variants
2016-10-17

Problems
- Too much data
- Tiny text
- What can we do?

200 ng bulk RNA incubated with ~0.5 pMol P7 (62-43) at 95°C for 3 minutes and then slow cooled to 50°C. Primer extended in the presence of ddCTP with Promega AMV for 1 hr at 50°C. 15% PA 7 M urea gel, Exposed 16 hours
### Poison Primer Extension of SUP4oc TS Variants

**2016-10-17**

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**200 ng** bulk RNA incubated with ~0.5 pMol P7 (62-43) at 95°C for 3 minutes and then slow cooled to 50°C. Primer extended in the presence of ddCTP with Promega AMV for 1 hr at 50°C. 15% PA 7 M urea gel, Exposed 16 hours.

![Graph showing RNA extension results](image)

**SUP4oc**

**WT tRNA^Tyr**

*Courtesy of Matt Payea*
Whatever this slide is actually about

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Courtesy of Matt Payea
PyLOOS Solution

- Read command line
- Create system
- Select “domains”
- Loop over trajectory
  - Compute distance
  - Compute angle
  - Compute torsion

```python
#!/usr/bin/env python3

import sys
import loos
import loos.pyloos
import math

header = " ".join(sys.argv)
print("# ", header)

sys_file = sys.argv[0]
traj_file = sys.argv[1]

# create the system and trajectory
system = loos.createSystem(sys_file)
traj = loos.pyloos.Trajectory(traj_file, system)

# apply selections to get atoms
sel1 = loos.selectAtoms(system, sys.argv[2])
sel2 = loos.selectAtoms(system, sys.argv[4])

# create the system and trajectory
system = loos.createSystem(traj_file, system)
traj = loos.pyloos.Trajectory(traj_file, system)

# apply selections to get atoms
sel1 = loos.selectAtoms(system, sys.argv[2])
sel2 = loos.selectAtoms(system, sys.argv[4])

for frame in traj:
    # compute distance
    centroid1 = sel1.centroid()
    centroid2 = sel2.centroid()
    diff = centroid2 - centroid1
    distance = diff.length()

    # compute angle between principal axes
    vectors1 = sel1.principalAxes()  
    axis1 = vectors1[0]

    vectors2 = sel2.principalAxes()  
    axis2 = vectors2[0]

    angle = math.acos(axis1 * axis2) * 180/math.pi

    # compute torsion between principal axes
    p1 = centroid1 + axis1
    p2 = centroid2 + axis2
    tors = loos.torsion(p1, centroid1, centroid2, p2)

    # write output
    print((traj.index(), distance, angle, tors))
```

File: /home/alan/presentations/bps2019/domain.py
Consistent visual grammar is important

- **Use unconscious expectations to help people**

- **How?**
  - Consistent nomenclature
  - Consistent colors and symbols
  - Simple slide formats
    - Position items consistently
Using color to convey data

- **Rule 1:** Must be visible
- **Rule 2:** Must contrast with each other
  - Avoid red/green for color-blind audience members
- **Rule 3:** Check on the worst projector you can find
  - Reds are always dimmer on projector vs. computer
- **Rule 4:** Program defaults usually lousy
Picking effective colors

- **Use a color wheel**
  - Colors evenly spaced around the wheel will contrast nicely

- **Tools to help you**
  - http://projects.susielu.com/viz-palette
Color maps

- **Use maps that capture variation evenly**
  - Most color scales distort differences
  - “parula” is good (default on matlab)

- **Make sure the colors emphasize what you want people to see**
  - Different color maps for all positive vs. positive and negative values
This is a map of probability differences

- Which changes are positive?
This is a map of probability differences

- Which changes are positive?
This is a map of probability differences

- **Which changes are positive?**
  - Neutral color at zero, different colors for positive and negative
How to organize a talk?

- **Chronologically**
  - Elements of a mystery can excite the audience
  - Reality often not that clear
    - Side paths can confuse the story
  - What about parallel paths?

- **Logically**
  - “Rewrite history” so the strategy makes sense

- **Don’t report everything you did**
  - More true the further you go in science

- **No one right answer**
  - Don’t get wedded to one approach
Principles

- Know your audience
- Make it easy for them
- Master your tools
Making good slides can be time-consuming

- Invest in your skills
- Use the best tools
- Learn to automate
Which tools?

- **Plotting**
  - Hard to make good plots in *Excel*
  - Defaults are usually terrible
  - *gnuplot* is my favorite
  - *matplotlib* and *seaborn* are good if you speak python
  - *ggplot* for R folks

- **Vector graphics**
  - Composing images / Drawing
  - *Illustrator* is industry standard
  - *inkscape* is good free alternative

- **Specialty tools**
  - Molecular graphics like *pymol* and *VMD*
Which tools?

- **Presentation software**
  - Keynote
  - PowerPoint
  - Both are very powerful, so pick one and master it
How to choose?

- Cost and platform
- Capability
- Operating system
- Can you automate common tasks?
  - Easier to be consistent if you can automatically regenerate plots
  - gnuplot and matplotlib/seaborn are very scriptable
Take time to learn what the tools can do

- Take time to play
- Look for a “better way”
  - Will take longer the first few times
  - Payoff is down the road
- Use online tutorials
- Classes for some tools
Opportunities for Automation

- Templates in presentation software
- Scriptable plotting software
- Make notes of your tricks
  - My lab uses a wiki
- Good for reproducibility too
  - Data analysis *(manual is BAD)*
  - Make processes self-documenting
Practical rules of thumb

- **Less text is better**
  - Bullets rather than sentences
  - Big fonts

- **Use color consistently**

- **Slides are cheap**
  - 1 idea per slide
  - Build complex plots sequentially

- **Every slide needs a title**

- **Avoid visual distraction**
  - Simple templates
  - No gratuitous animations
Warning signs

- A slide takes forever to explain
- “I know you can’t read this, but…”
- “You only need to look at this part…”
- Multi-panel figures

These things should make you think twice
Humor

- Double-edged sword
- Know yourself
- Don’t build it into your slides
Practice and Testing

- Practice your talks
  - Rehearse transitions
  - Short talks are harder
  - Not just in front of your lab

- Test on projectors
  - Contrast is lower on big screen

- Refine with feedback
  - Make changes after giving the talk
Talks and papers are different

- **Design figures accordingly**

- **Papers**
  - Space is precious
  - Time is cheap
  - Multipanel figures good
  - Complex figures ok

- **Talks**
  - Space is cheap
  - Time is precious
  - Multipanel figures evil
  - Complex figures evil
Conclusions

- Primary goal is for audience to understand and appreciate your work
- Find your style
- If the audience only remembers one sentence...
Feedback

- What was good about the workshop?
- What didn’t work?
- Tell me or email me
  - alan_grossfield@urmc.rochester.edu
  - I will send a survey link within a few days to get more feedback
- This talk

- Poster workshop this winter!