Presentation Skills Workshop

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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

- **There are no absolute rules!**
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
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
Cardiac hypertrophy is reduced in A57G vs Δ43 offspring

3) Data are mean ± SD with *P<0.05 depicting significance between Tg-A57G (n=9 animals) / Tg-Δ43 (n=9 animals) / Tg-A57G X Tg-Δ43 (n=6 animals) vs Tg-WT (n=9 animals) and # between mutants, by one-way ANOVA with Tukey’s multiple comparisons test. Open symbols-F; closed symbols, M.

Slide donor wishes to remain anonymous
Cardiac hypertrophy is reduced in A57G vs Δ43 offspring

How to improve?
- Show 1 panel at a time?
- Build up to show more?
- Make labels much bigger
- Slides are free!

Slide donor wishes to remain anonymous
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

Courtesy of Dr. Matt Payea
Poison Primer Extension of SUP4oc TS Variants  
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Courtesy of Matt Payea
**Whatever this slide is actually about**

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[Image of gel electrophoresis with bands labeled SUP4oc and WT tRNA_{Tyr}]

*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 = "\n".join(sys.argv)
print("# " + header)

sys.argv = sys.argv[1:]

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

# apply selections to get atoms
for frame in traj:
    sel1 = loos.selectAtoms(system, sel_string1)
    sel2 = loos.selectAtoms(system, sel_string2)
    # apply selections to get atoms
    centroid1 = sel1.centroid()
    centroid2 = sel2.centroid()
    vectors1 = sel1.principalAxes()
    vectors2 = sel2.principalAxes()
    # compute the torsion between principal axes
    tors = loos.torsion(p1, centroid1, centroid2, p2)
    # write output
    print("\n", header)
    print(traj.index(), distance, angle, tors)
```

# compute distance
centroids = [sel.centroid() for sel in traj]
distance = diff.length()

# compute angle between principal axes
for sel1, sel2 in traj:
    centroid1 = sel1.centroid()
    centroid2 = sel2.centroid()
    vectors1 = sel1.principalAxes()
    vectors2 = sel2.principalAxes()
    # compute the angle between principal axes
    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(header)
    print(traj.index(), distance, angle, tors)
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](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
  - Could also put black in the middle, for dark background slides
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
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
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

- Use less text
- 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
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?
- Email me
  - alan_grossfield@urmc.rochester.edu
- PDF of this talk