

Department of Biochemistry and Biophysics, University of Rochester Medical School

# Presentation Skills Workshop

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## Learning objectives

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

## 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

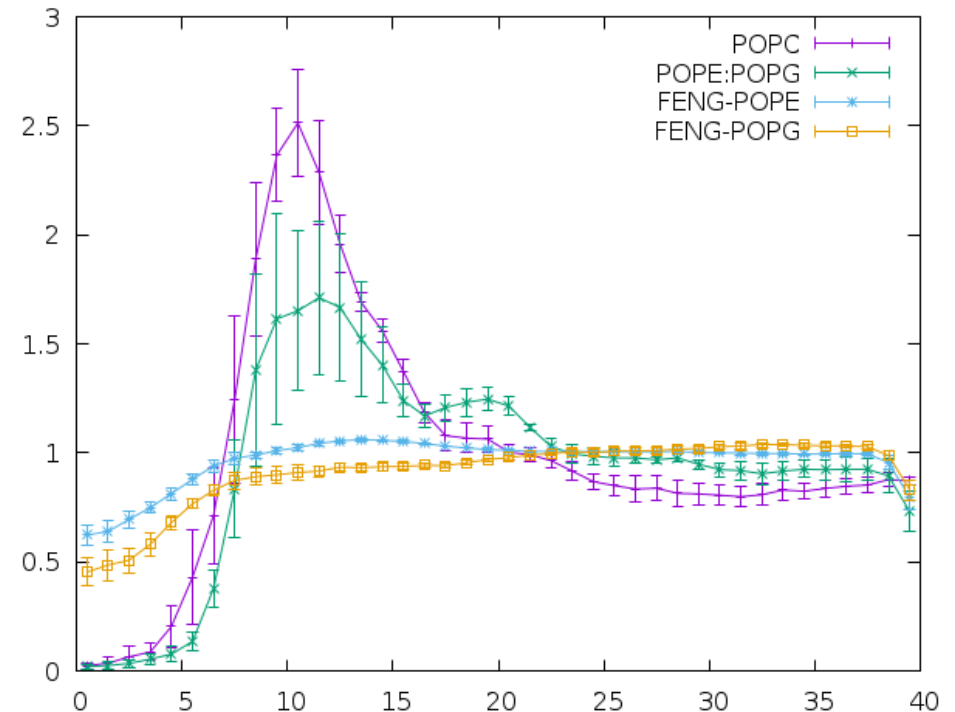
- **Large fonts**
- **Contrasting colors**
  - Check on a projected screen
- **Sparse text**
  - Listening, not reading
  - You're giving the talk, not your slides

## 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 obvious what they should look at**

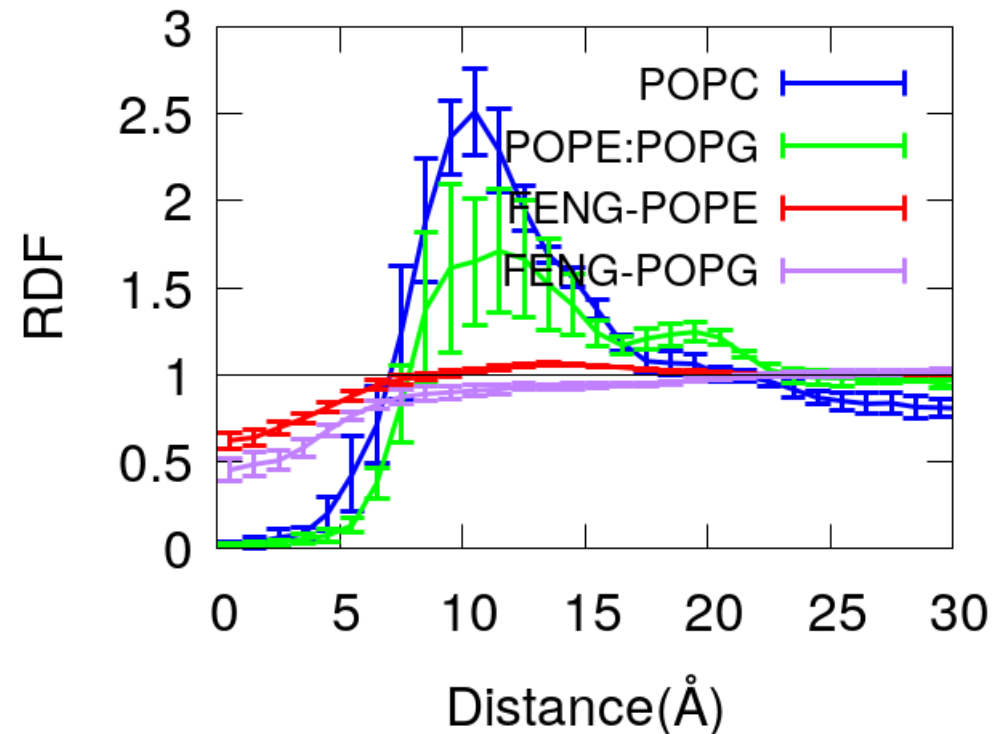
## Bad plot

- **Too many curves**
  - What is focus?
- **Lines are thin and hard to see**
- **Would you guess that the deviation from  $y=1$  is the important part?**



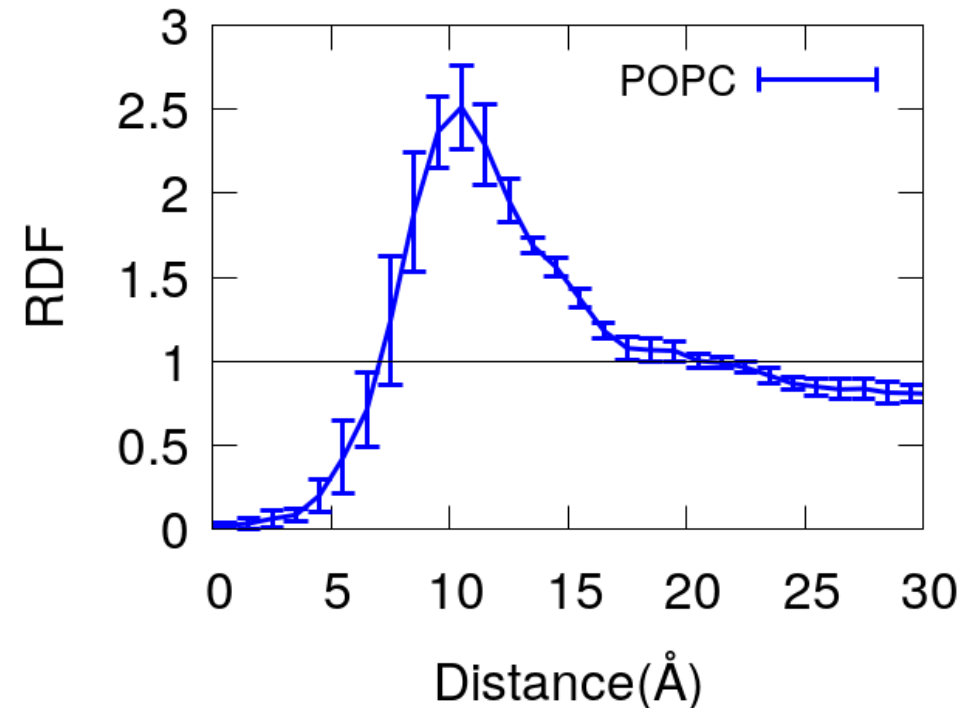
## Better

- Lines thicker
- Added line at  $y=1$
- Bigger fonts
- Still not perfect because the text overlaps the data



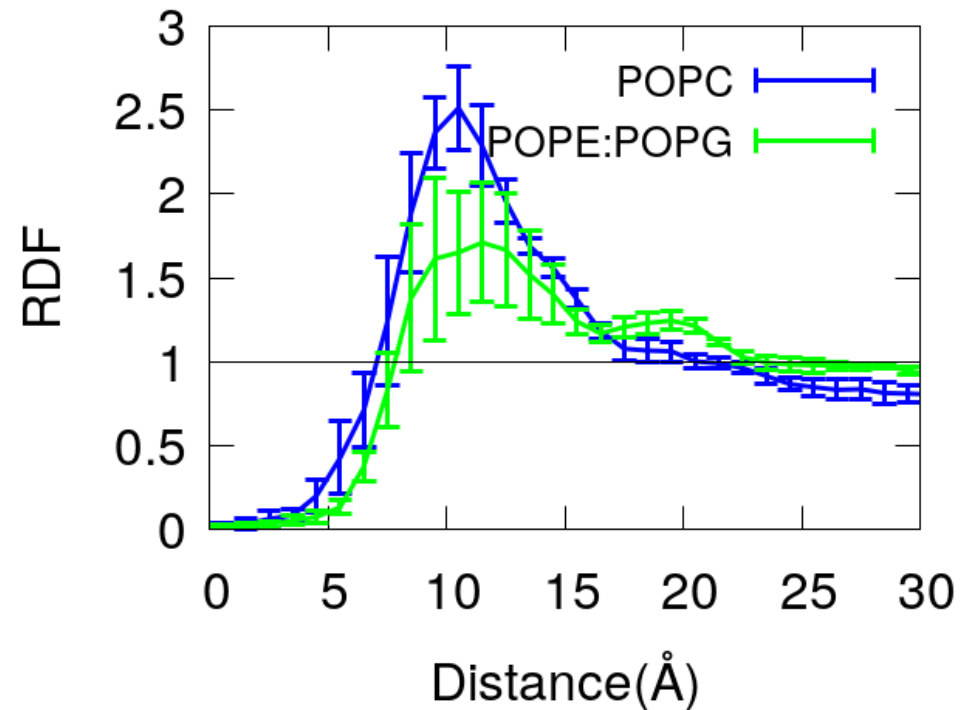
## Better still: multiple slides

- **Audience unfamiliar with RDF**
  - Use plot with 1 curve to explain features
  - Easier to get people to look at what you want if there's only 1 thing on the plot

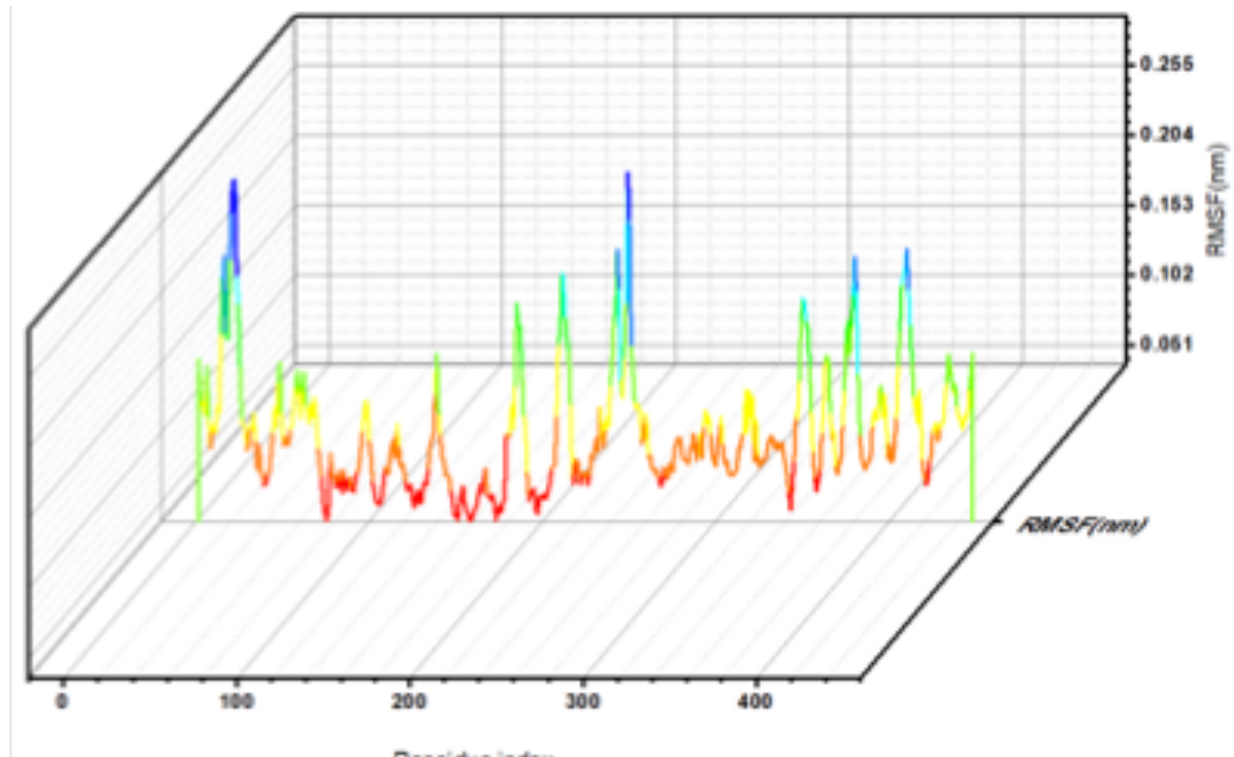


## Better still: multiple slides

- Use plot of 2 to make comparison
- Third plot to compare the other curves



# Simple is better



## 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**

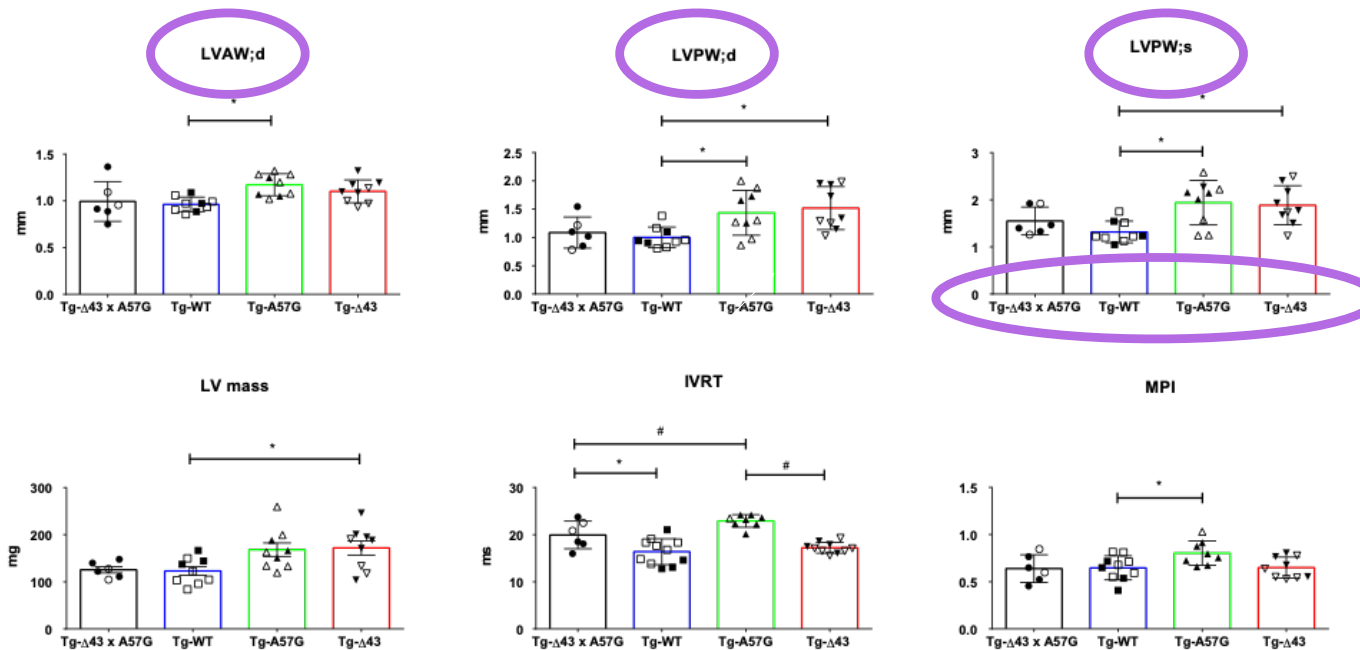
- Builds can be useful if there’s lots of stuff on the slide
- Also makes it harder to make and maintain the slides

## Multipanel plots are evil

- **Hard to know where to look**
- **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 $\Delta 43$ offspring

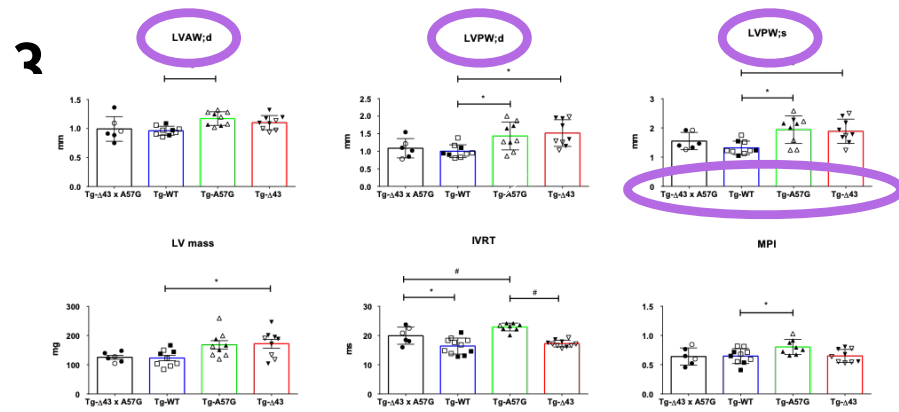
3)



Data are mean  $\pm$  SD with \* $P < 0.05$  depicting significance between Tg-A57G (n=9 animals) / Tg- $\Delta 43$  (n=9 animals) / Tg-A57G X Tg- $\Delta 43$  (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 $\Delta 43$ offspring



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## 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

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

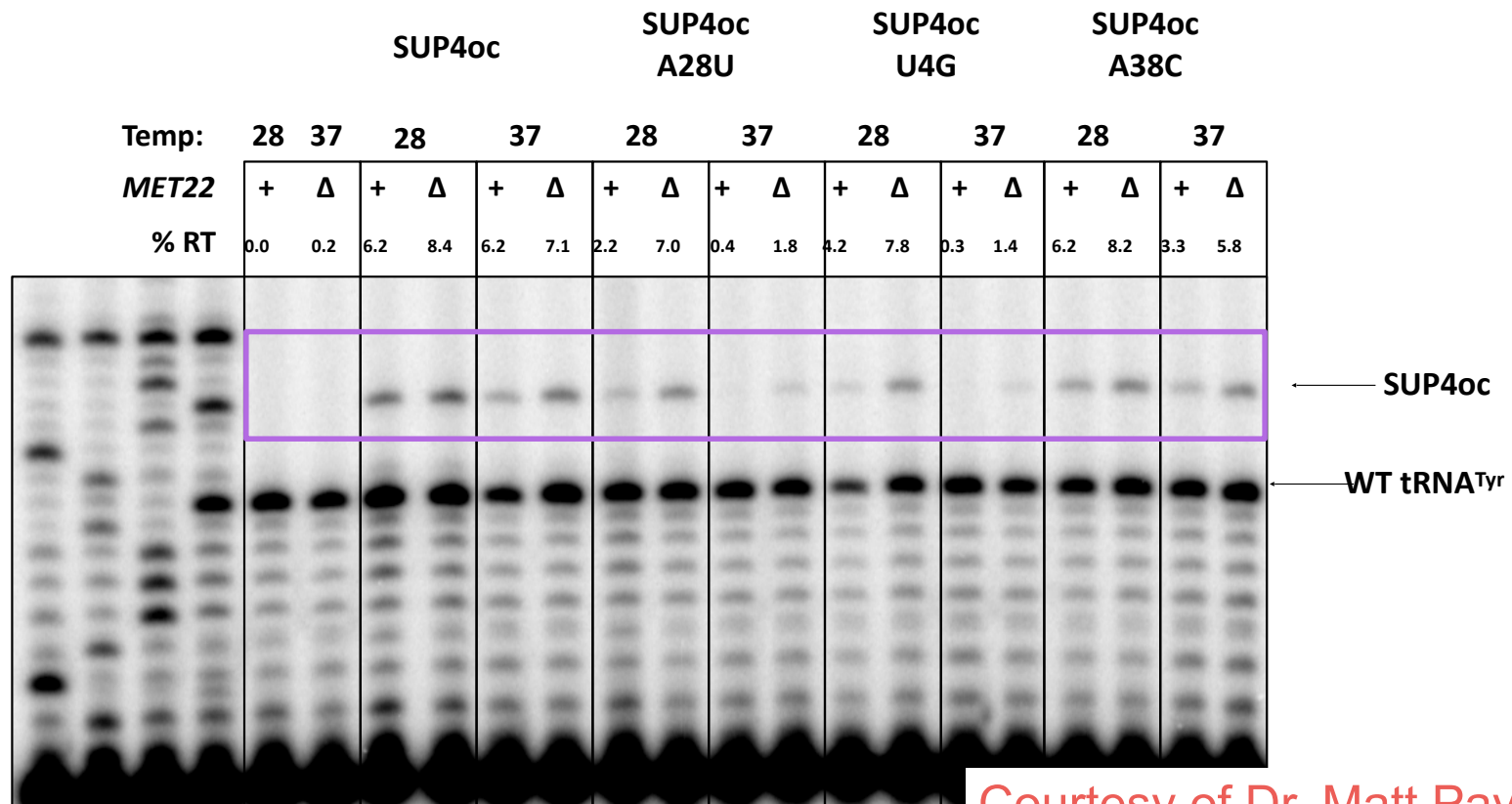
## Problems

- Too much data
- Tiny text
- Non-descriptive title
- What can we do?



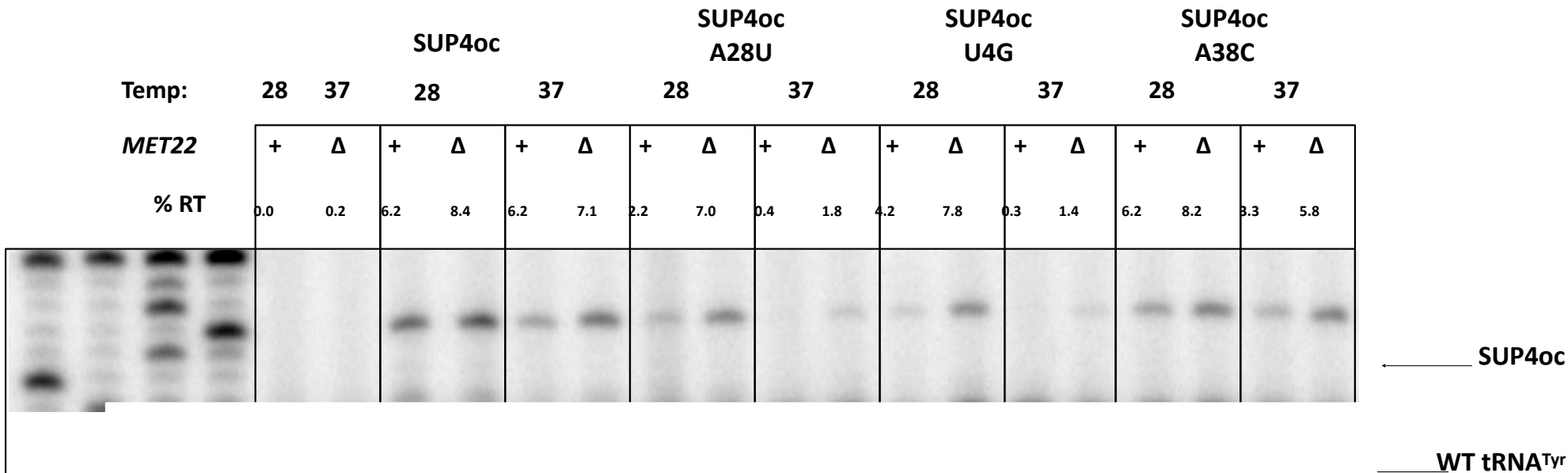
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Courtesy of Dr. Matt Payea

## Whatever this slide is actually about



Courtesy of Matt Payea

# PyLOOS Solution

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

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

import sys
import loos
import loos.pyloos
import math

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

# create the system and trajectory
system_file = sys.argv[1]
traj_file = sys.argv[2]
system = loos.createSystem(system_file)
traj = loos.pyloos.Trajectory(traj_file, system)

# apply selections to get atoms
sel1 = loos.selectAtoms(system, sel_string1)
sel2 = loos.selectAtoms(system, sel_string2)

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

    # compute angle between principal axes
    vectors1 = sel1.principalAxes()
    vectors2 = sel2.principalAxes()
    axis1 = vectors1[0]
    axis2 = vectors2[0]
    angle = math.acos((axis1 * axis2).length()) * 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)
```

## Consistent visual grammar is important

- **Use unconscious expectations to help people**
- **How?**
  - Consistent labelling
  - Consistent colors and symbols
  - Simple slide formats
  - Position items consistently

## Using color to convey data

- **Rule 1: Must be visible**
- **Rule 2: Must have contrast**
  - 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>

- **Tools to check for color-blind view**

- Sim Daltonism on Mac



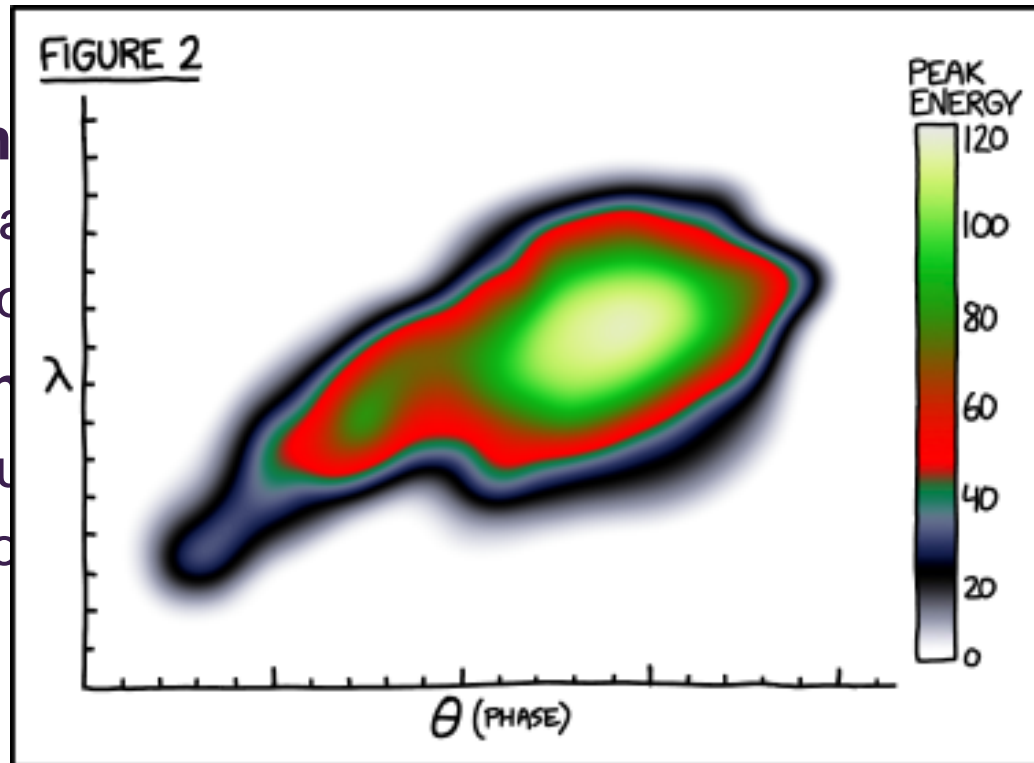
## Color maps

### ■ Use maps that

- Most color scales
- “parula” is good

### ■ Make sure that

- Amplitude of values
- Distinguish points



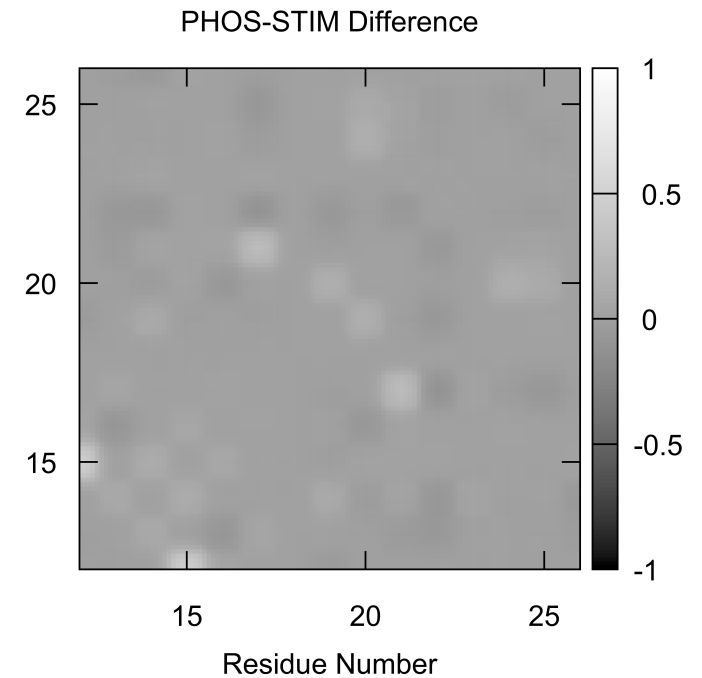
people to see

EVERY YEAR, DISGRUNTLED SCIENTISTS COMPETE  
FOR THE RAINBOW AWARD FOR WORST COLOR SCALE.

<https://xkcd.com/2537/>

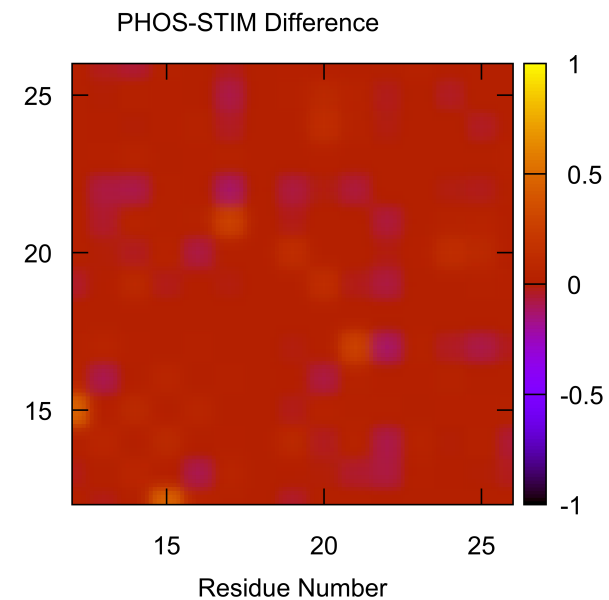
This is a map of probability differences

- **Where did probability go up?**
  - Hard to tell because 0 isn't special



This is a map of probability differences

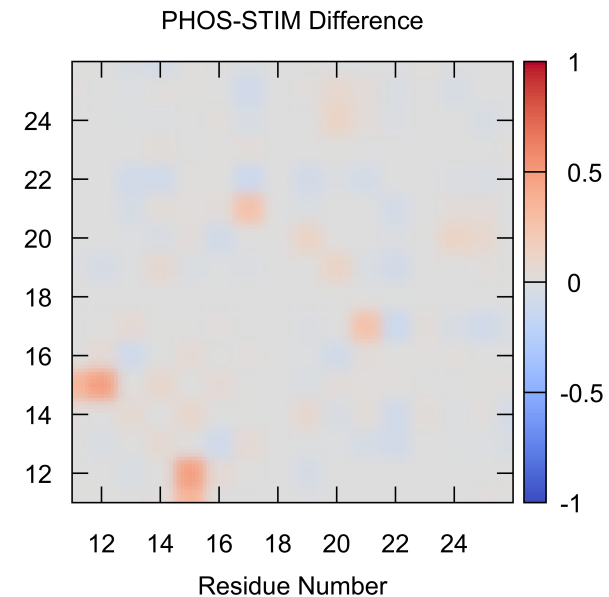
- **Which changes are positive?**
- **Diverging color map**
  - Ends are different color
  - yellow positive, purple negative
  - Still hard to read



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

# 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
- matplotlib is good if you speak python
- ggplot for R folks
- Defaults are ~~usually~~ terrible

### ■ Vector graphics

Be very careful with AI!!!

- Composing images / Drawing
- Illustrator is industry standard
- Inkscape is good free alternative
- Biorender/Biolcons

### ■ 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 LabArchive page
- **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

## Light vs. Dark Backgrounds

- **Controversial**
- **Dogma is dark for projected media, light for reflective**
  - Posters → light
  - Slides → dark
- **Dim room → dark is better**
- **Data figures easier to make for light**
- **Light translates to printed page more easily**
- **I go back and forth**

# Humor

- **Double-edged sword**
- **Know yourself**
- **Never punch down!**
- **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
- That means the practice has to be EARLY

## 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...**