Department of Biochemistry and Biophysics

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

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

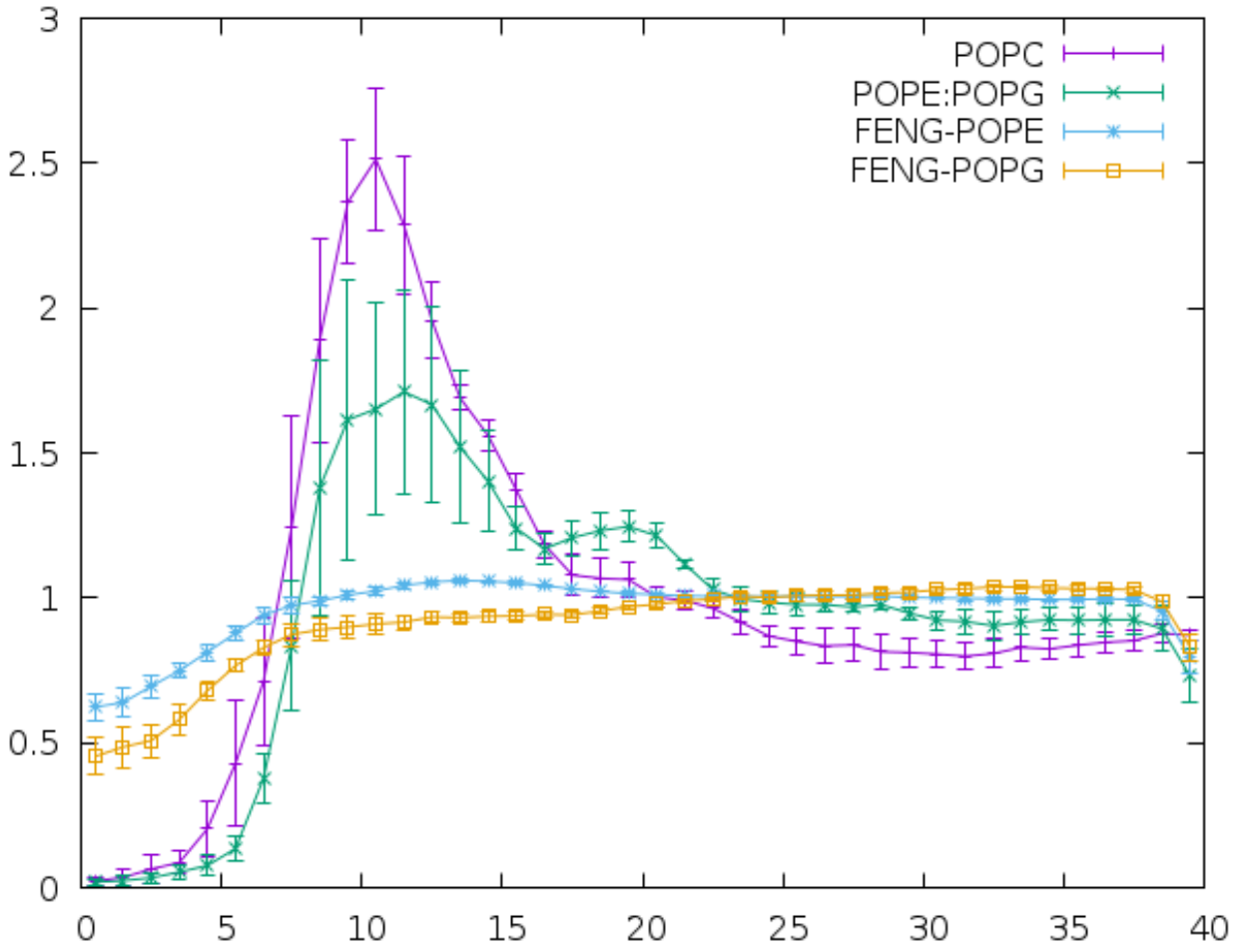
Readable plots

- **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

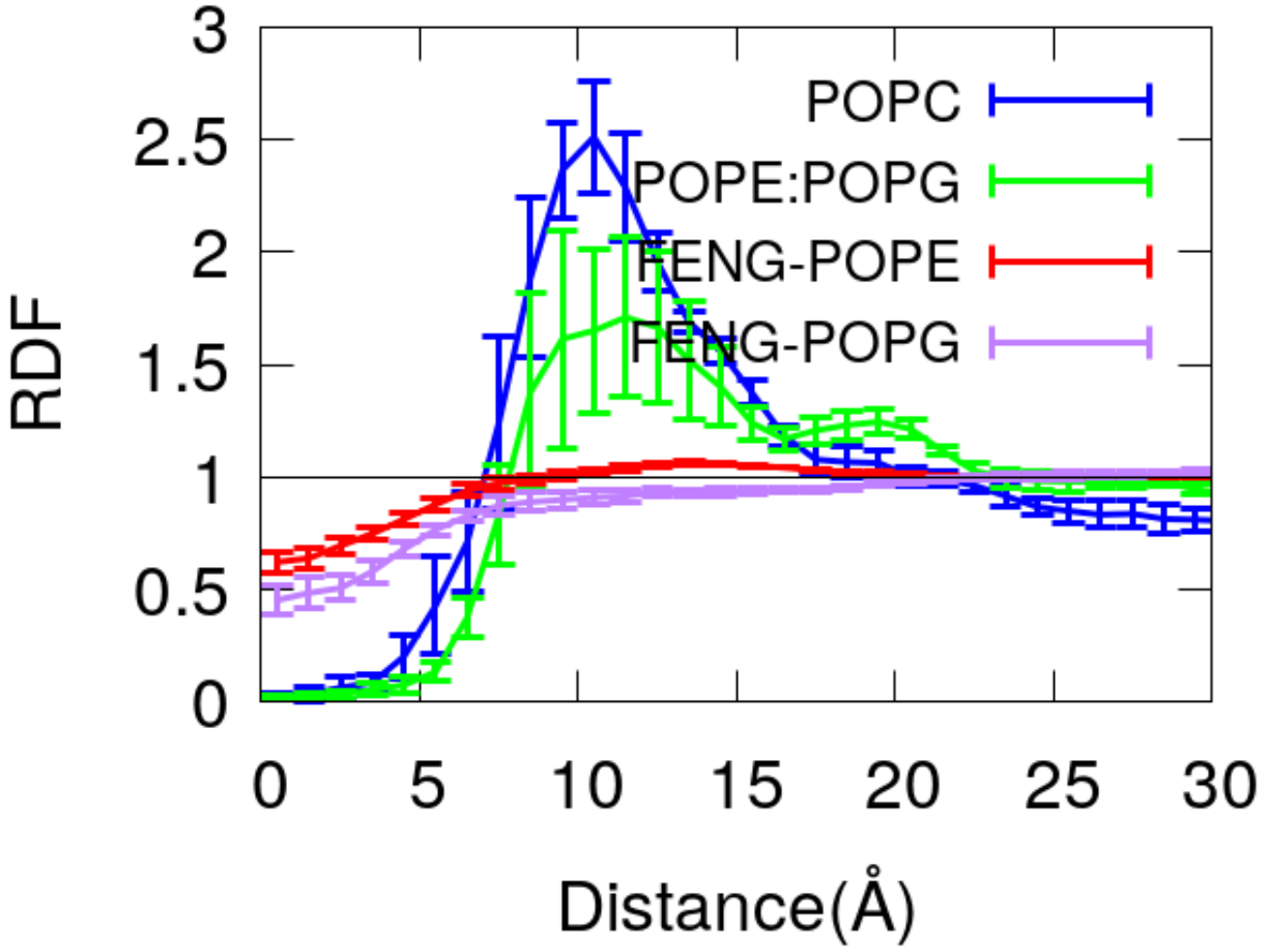
- **Complex figures are hard**
  - Hard to know what to look at with 5 curves
  - Especially true with unfamiliar plots
- **Make it easier by doing it piecewise**
  - Show 1 curve, discuss features
  - Add other curves after
  - Add only what you're discussing

Bad plot



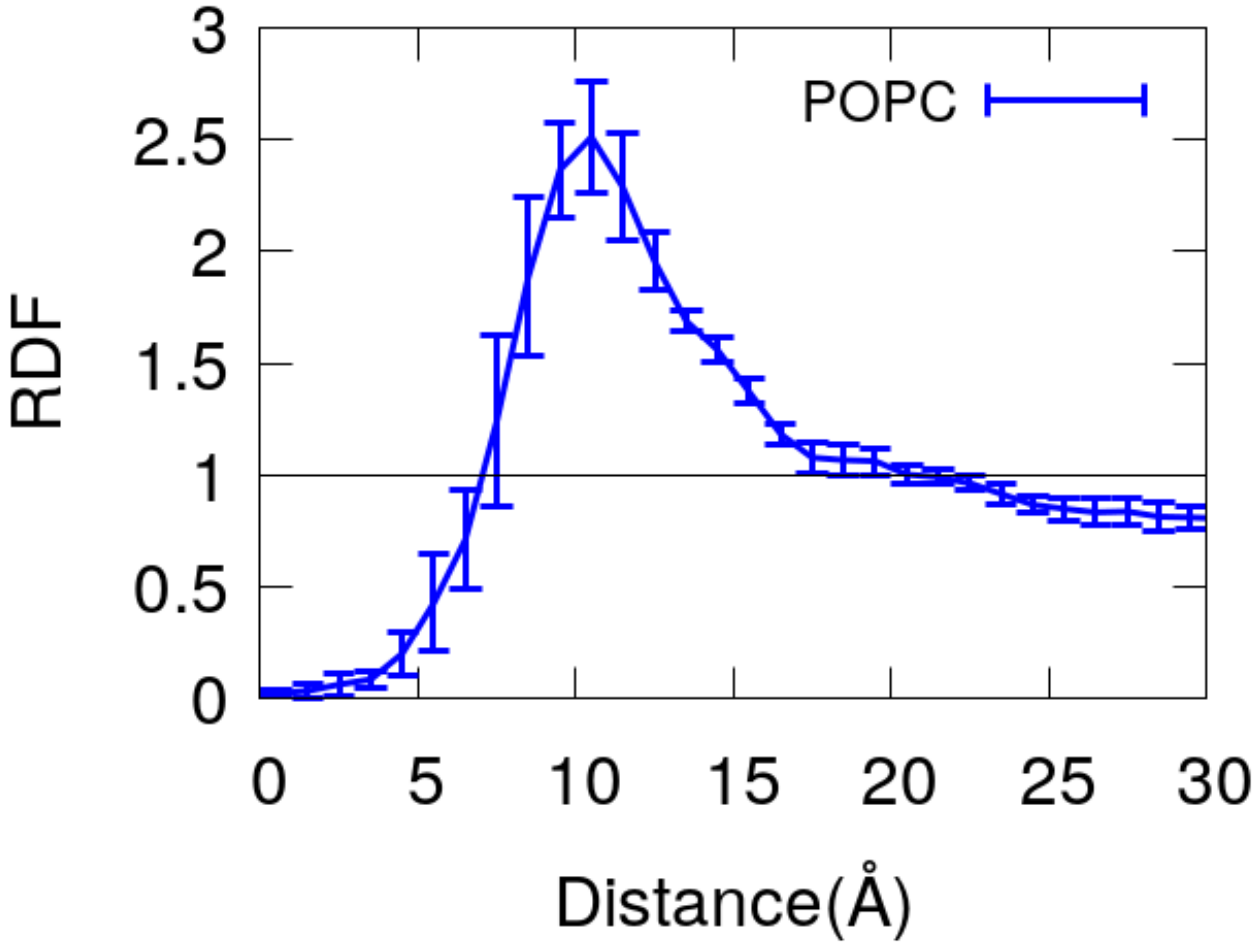
- **Too many curves**
  - What is focus?
- **Lines are thin and hard to see**

Better



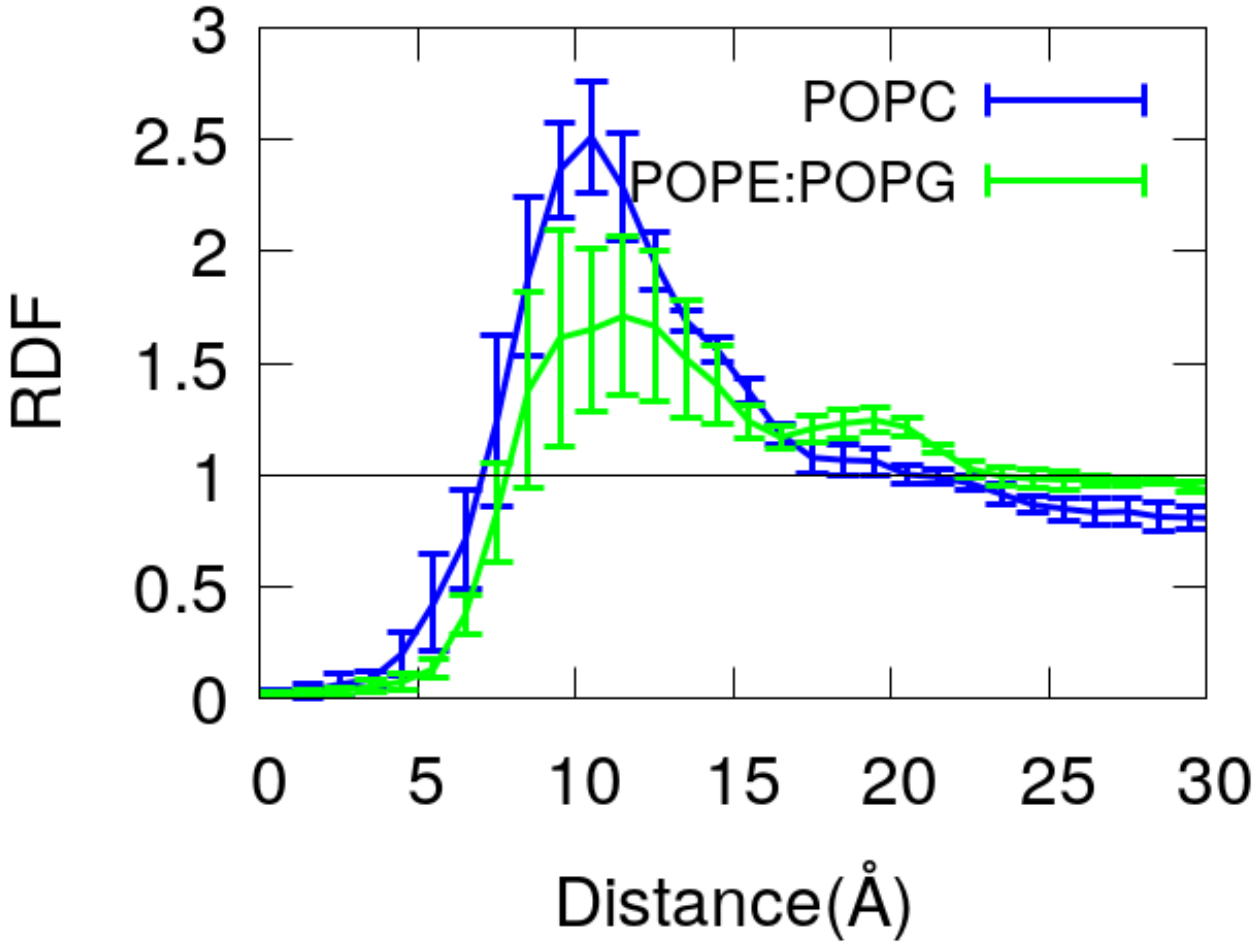
- **Lines thicker**
- **Added line at y=1**
- **Bigger fonts**

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**

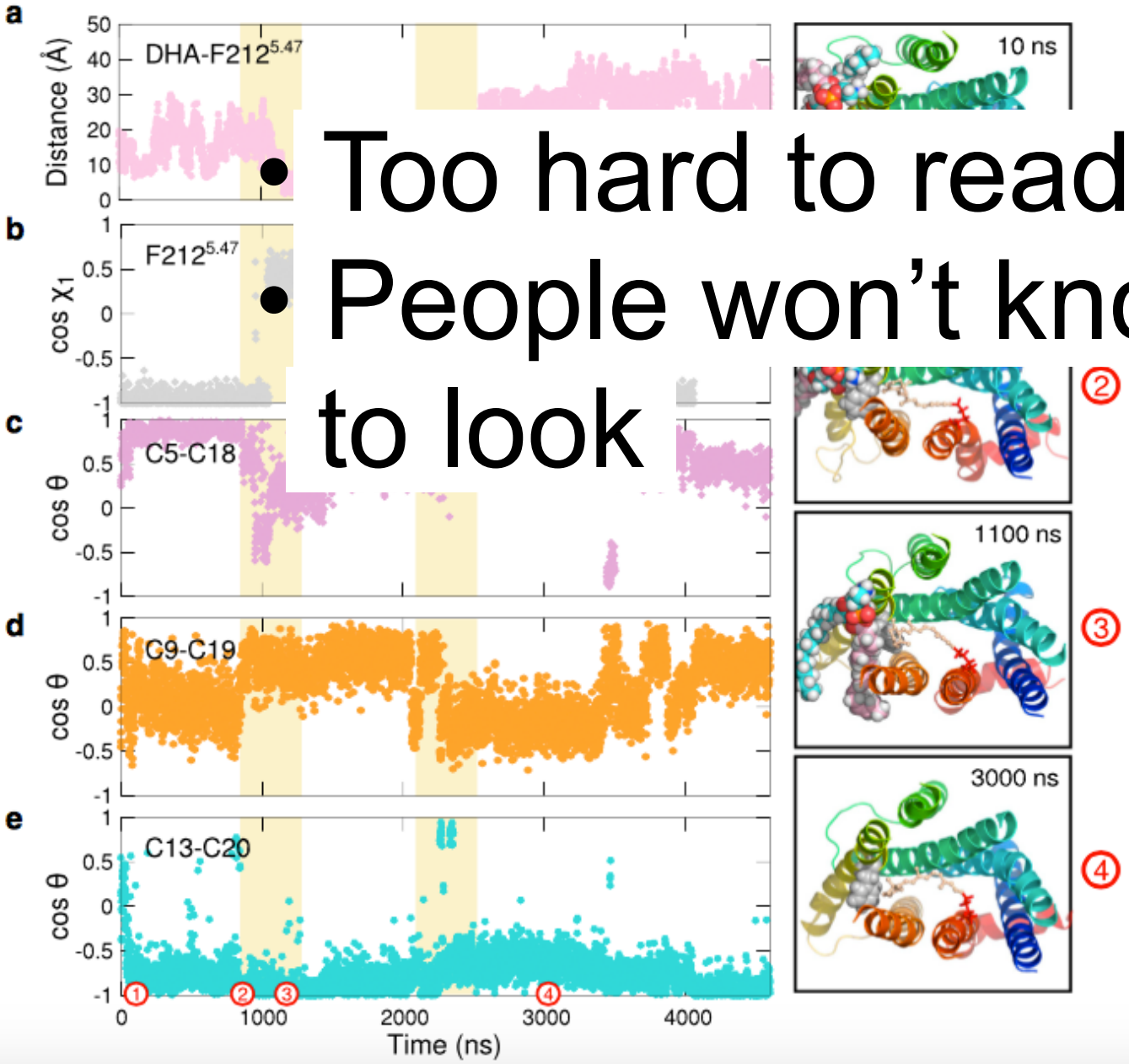
Each slide has 1 message

- **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

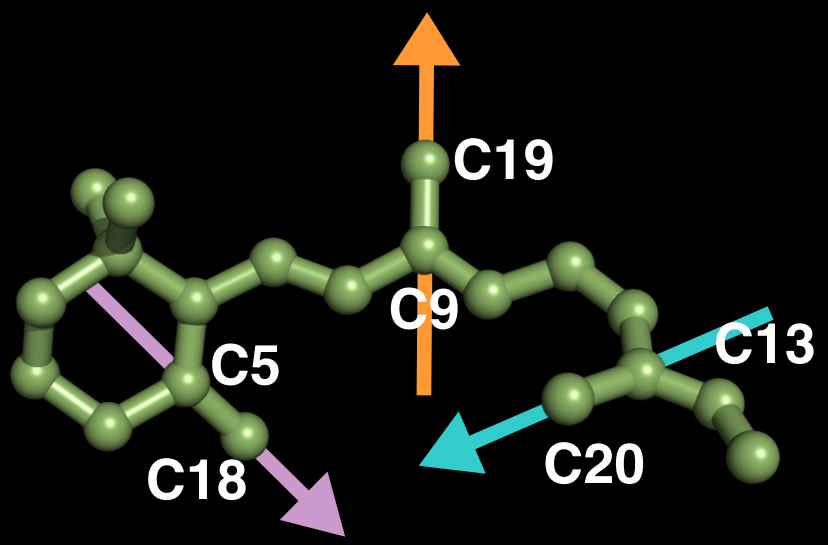
Lipid binding causes concerted structural changes



- Too hard to read
- People won't know where to look

FIGURE 5 Direct DHA-rhodopsin interactions side chains series of the n distance between a DHA acyl chain and protein residue $F212^{5.47}$ in one of the dark-state trajectories. (*b*) Time series of the χ_1 torsion angle of $F212^{5.47}$ 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). $K296^{7.43}$ 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?



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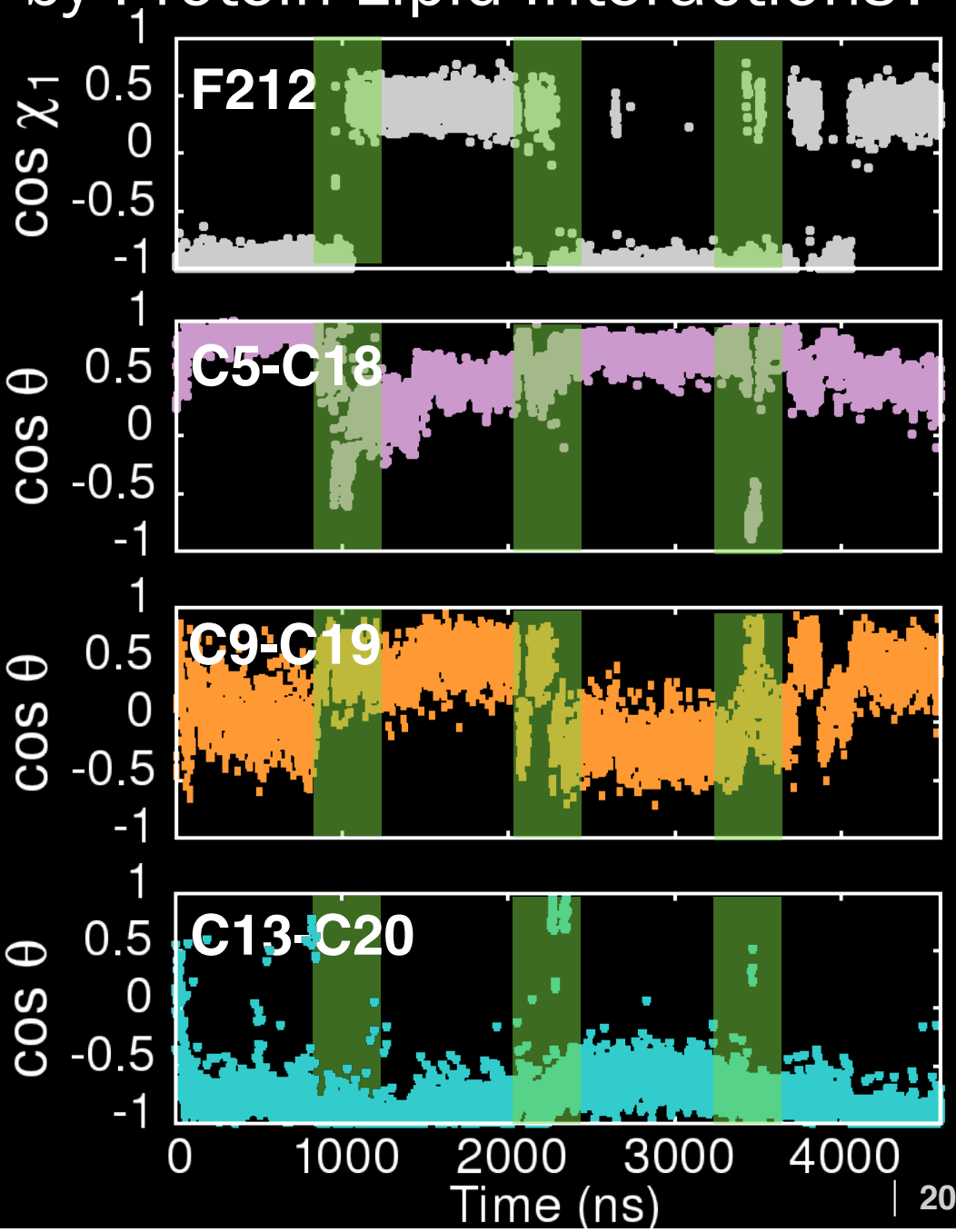
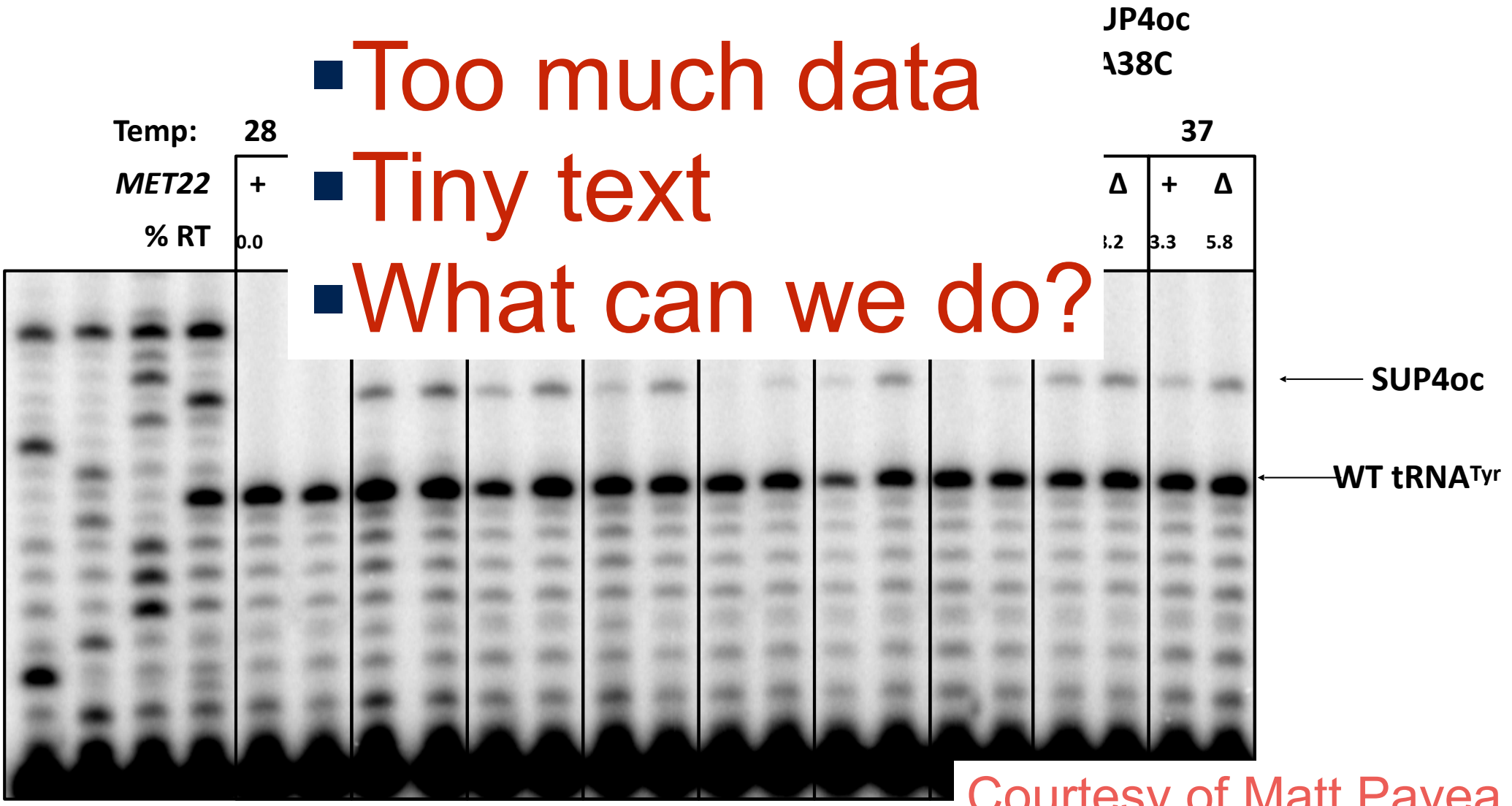


Poison Primer Extension of SUP4oc TS Variants
2016-10-17

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
- What can we do?



Courtesy of Matt Payea

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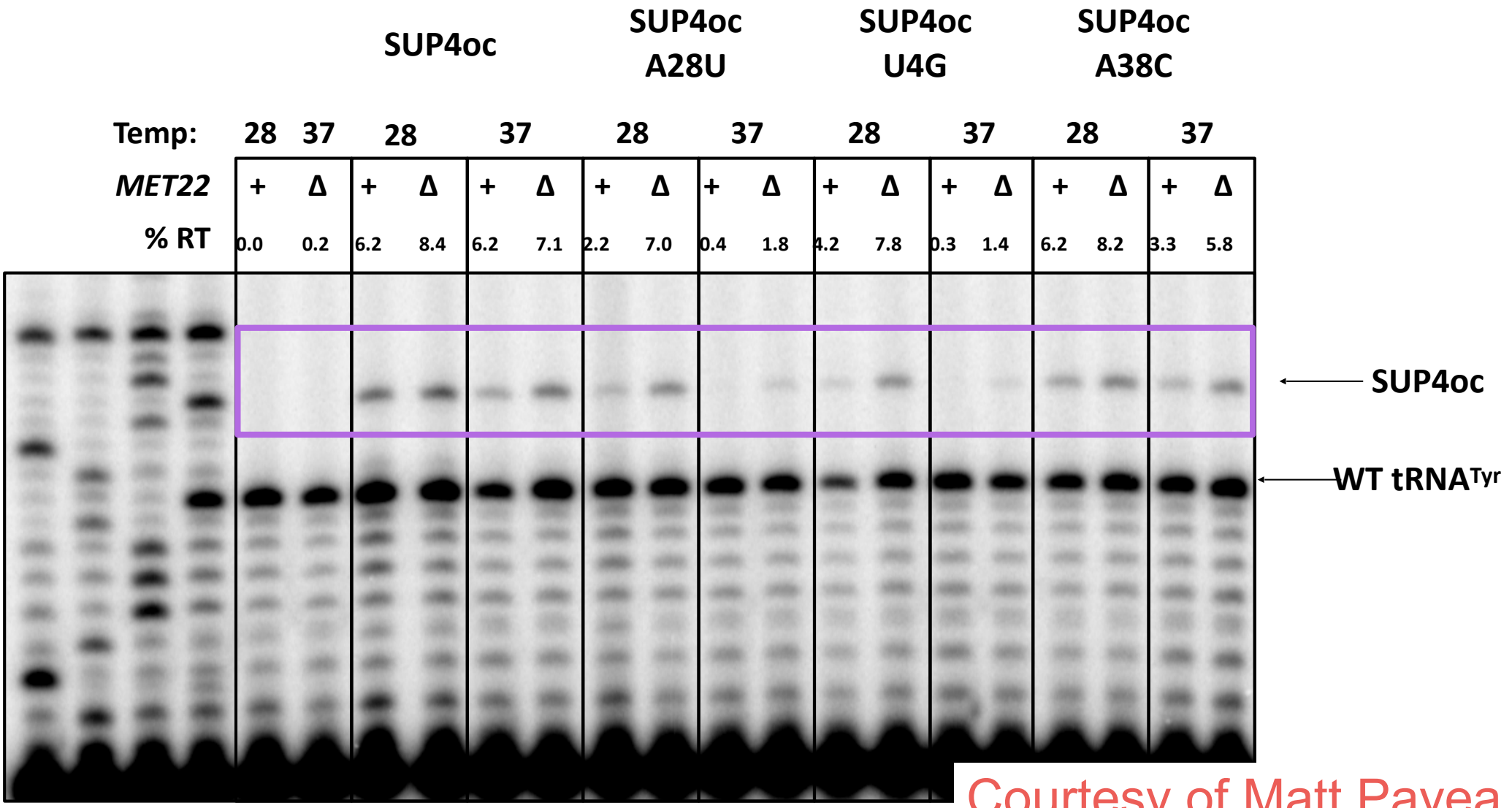
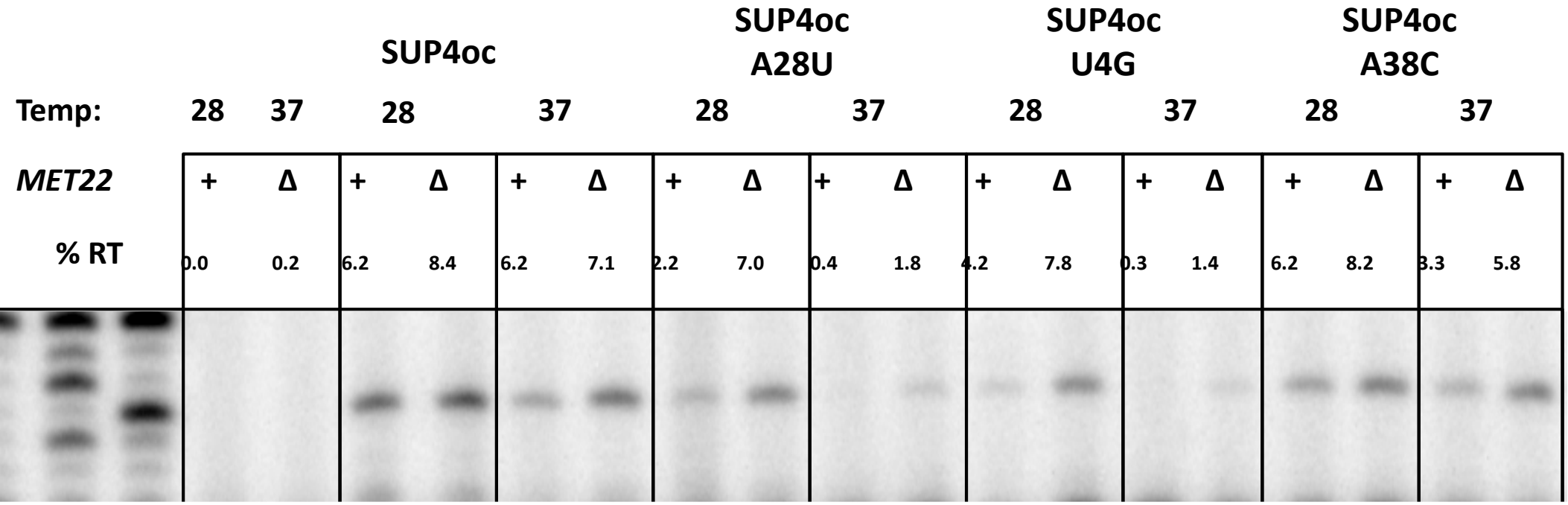


Courtesy of Matt Payea

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)

system_file = sys.argv[1]
traj_file = sys.argv[2]
sel_string1 = sys.argv[3]
sel_string2 = sys.argv[4]

# create the system and trajectory
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()

    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)
```

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**

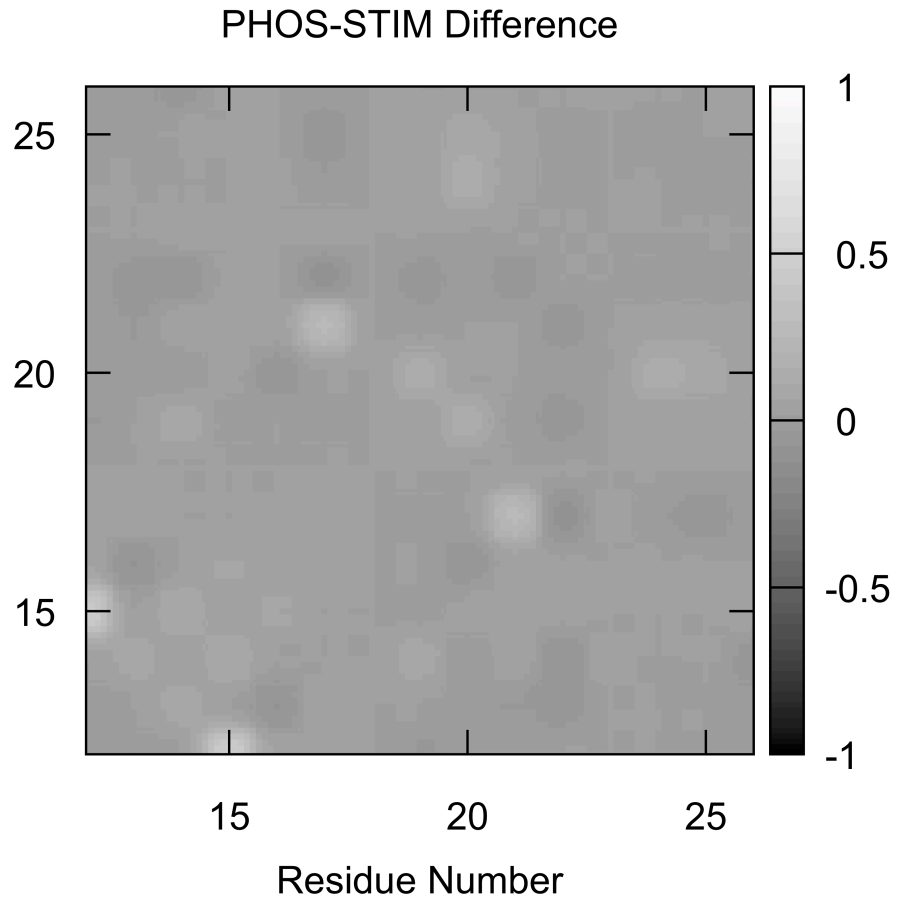
Picking effective colors

- **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

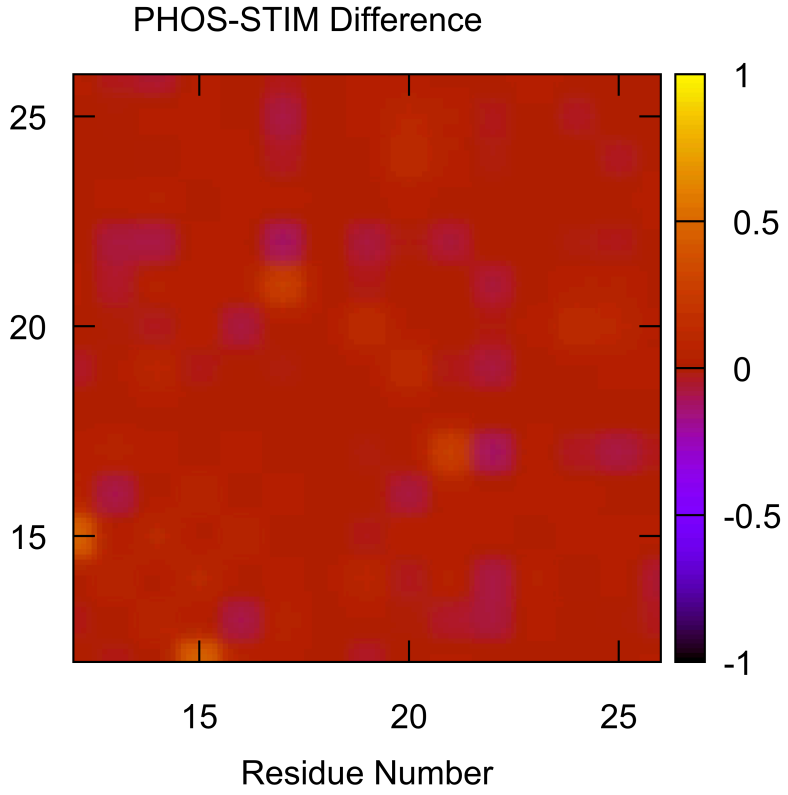
- **Use maps that capture variation evenly**
  - Most color scales distort differences
  - “parula” is good (default on matlab)
- **Make sure the colors emphasize what you want people to see**
  - Different color maps for all positive vs. positive and negative values

This is a map of probability differences



- **Which changes are positive?**

This is a map of probability differences



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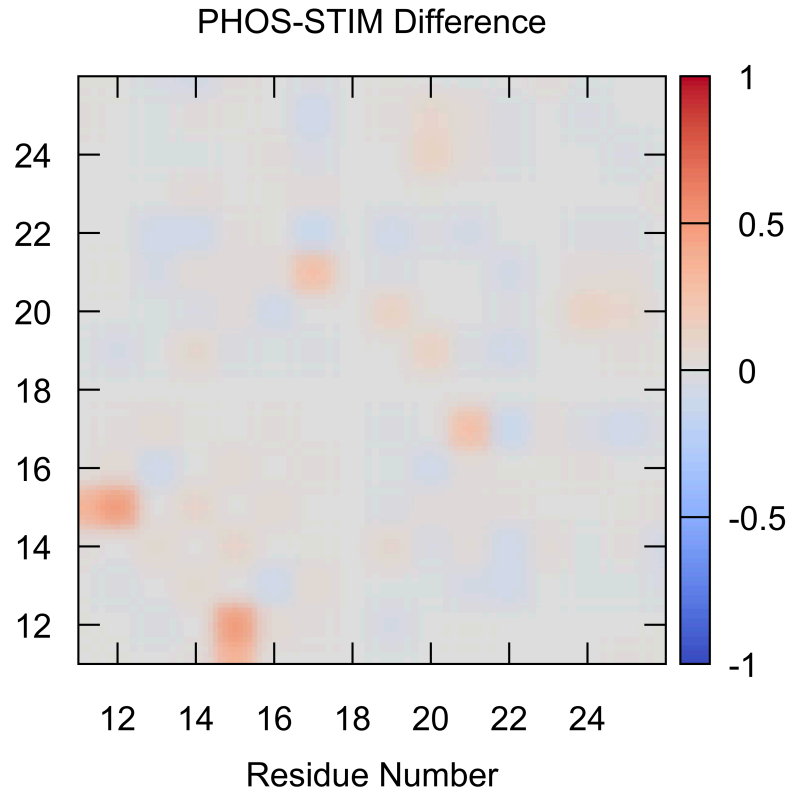

- **Which changes are positive?**
  - Neutral color at zero, different colors for positive and negative

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**
  - http://bit.ly/2YgsVGY

- **Poster workshop this winter!**