Simple rules to make an effective scientific presentation

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Why am I giving this talk?

1. A Friday afternoon chat ➔ inadvertent volunteering!
2. I've fixed the slides of several bosses, peers, friends,

   not-so-good friends & *well*...
3. So what? I *think* I have a fair understanding of what doesn't work!

   And, here (& here alone!) I *think* most people agree with me!
4. I am not shy when it comes to sharing what I think/what I've learnt!
5. Most importantly, I have a selfish motive here!

   Nicer slides are easier on *my eyes* & not fixing them saves *my time*!

This talk

1. **Preparation**
2. Structure
    a. What is the purpose of a talk
    b. Three phases; hourglass model
3. Content
    a. Style
    b. Text & visual aids
4. Delivery *aka* the actual Talk!

Preparation

The nervousness, the excitement, and ...
the procrastination!

What can go wrong?

10. Rushing through all your slides, no matter what!

9. Leaving no time for discussion

8. Not doing dry runs

7. Not understanding what can/can‘t be achieved

6. Using journal article graphics *as is*

Nature Blogs: 2016-02-10

What can go wrong?

5. Overwhelming slides, *death by powerpoint*

4. Failing to develop/create insightful visualizations

3. Not understanding how hard it is to gauge your audience

2. Failing to put yourself in your audience's shoes

1. Thinking a collection of slides is enough

Nature Blogs: 2016-02-10

The first steps: Why & what

- Why really?
  - ➜ to find a job
  - ➜ identify collaborators or
  - ➜ get feedback?
- What do you want to talk about?
  - ➜ multiple stories? Are they connected?

Every talk should motivate a problem.

The first steps: Who

- Who is your audience?
  - ➔ technical or non-technical?
  - ➔ students, postdocs or faculty?
  - ➔ job talk/annual student requirement?

Your audience determines the talk.
What's in it for them?

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Structure

The purpose, the be all & end all, and ...
the actual outline

Popular presentation styles

- Visual
- Freestyle
- Storytelling
- Plugged-into-the-audience
- The Data Scientist
- The Closer
- The Director

Great styles but not for academic talks?

➜ Lessig & Takahashi

Hubspot blog: 2018-09-24; Forbes: 2016-01-26

How to start

- Pick your platform
- Plan a clear story
- Create a logical outline (talk, *not* paper!) ➜ *Reuse*!
- Figures > Flowcharts > Text
- Fill in the necessary background
- Animations
- Close

Know your audience ➔ Set your background

- Who is your audience? What's the message?
  - Different slide for collaborators & for novices in your field
  - Are there more students (go after concepts!) or experts in the crowd?
- Is the data current?
- Is the layout appropriate?
  - Is your take-home/topic screaming loudly from the top?
  - No? Replot or change it!
  - Don't just draw a box around a small area in the old figure!

Scientific presentation: How to structure your talk

Phase 1: Setting up the talk

a. Big picture context ➜ memorize the first 2min/2 slides of your talk
b. Key questions
c. Don’t bury the lead ➜ get to your main result quickly

Phase 2: Methods and Results

a. Keep methods brief ➜ *Benefit must outweigh the loss of attention!*
b. Answer the questions you raised earlier

Phase 3: Concluding the talk

a. Brief recap of the answers to the questions
b. Provide context for why your results are important in the big picture

Will Ratcliff: David Attenborough style of scientific presentation

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Content

The style, the visuals, the text!

Examples follow (not inline, yet).

#1 Provide only one point per slide

- One idea per slide
- (**Q**): Previous slide should create intrigue about something
- **Q**: Current slide should make that intrigue concrete by raising one clear question
    - **A**: Title should be the A to that Q in full sentence
- **A**: The content of the slides should answer that question
- End with creating intrigue about something else ➜ New Q!

#2 Limit use of text

- Limit words ➔ use visuals
- Avoid Death by PowerPoint
- Images, diagrams, flowcharts are better than text

#3 Develop a consistent theme

- **Consistency, consistency, consistency!**
  - ➔ font type, font size for title/heading/subheading
  - ➔ ~ for texts in bullets, figure captions, references...
- **Align things <u>perfectly</u>!**
  - ➔ left, center, or right align perfectly as you see fit
  - ➔ align with respect to the whole slide/a few objects in the slide
- **Distribute things equidistantly**
  - ➔ across the slide
  - ➔ *e.g.*, if you have three pictures in a single row in the center of the slide, make sure they are equally-spaced from each other.

We are all spatial/visual thinkers and suckers for symmetry/balance!

#4 Use simple visuals

- Yeah, figures are good...
  - But make *talk*-figures not reuse *paper*-figures!
- One figure, one message
- Build up the story ➜ one step at a time
- Make your own graphics as much as possible.
- No? Edit it to fit your theme! Not the other way around
  - Crop/recolor, add theme-matched filled shapes to cover

#5 Captions are not optional!

- What’s the role of your figure?
  - Does your intended message jump out?
- Captions ≃ to the title of your results/figure or even the slide
  - The main result/import from your figure
- Your explanation ≃ the figure legend!
- Key ≃ simplified to match the new figure

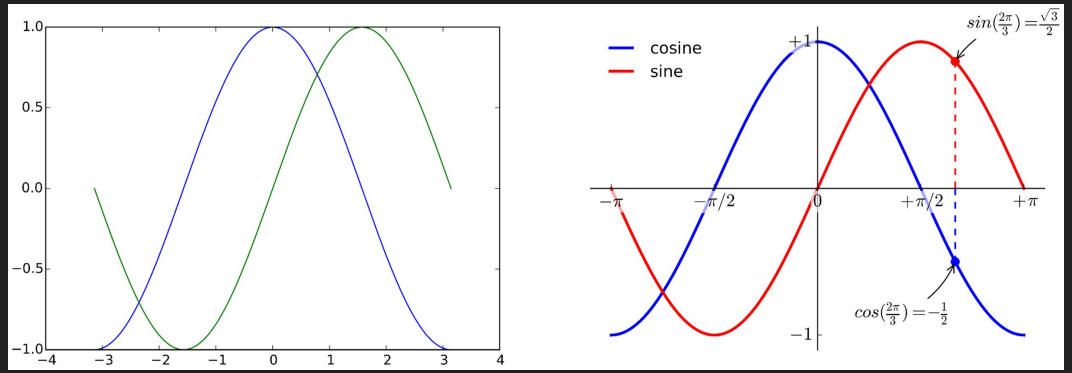
#6 Adapt the figure to the support medium

- Is it a talk or poster or paper?
  - Printed or presentation or both?
- Presentation? Keep it simple. *You are there to explain!*
  - Bigger font
  - Don’t use multi-panel figures from papers for your talks!
  - Bigger points, thicker lines
  - Contrasting colors

More on figures for posters/papers later.

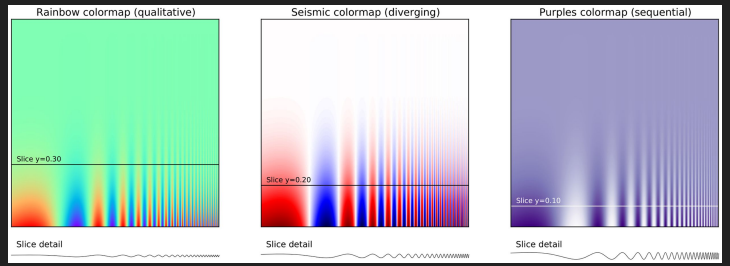
#7 Customize: Do not go with the defaults

- They are defaults for a reason
  - they are ‘general’ ≃ the average choice
- Customize to your data & your experimental set-up
- Customize to your plot
- Add appropriate labels, colors/shapes
- Sometimes, you have to remove to make it better (*e.g.*, excel!)



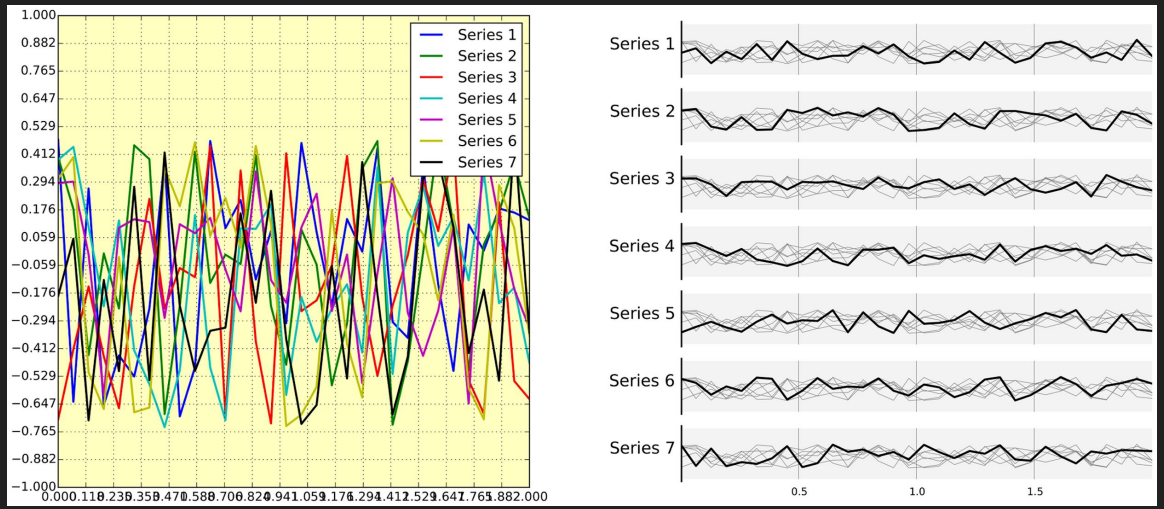
#8 Use color effectively

- Edward Tufte: Color can be your greatest ally or your worst enemy if not properly used
- Color should enhance the effect & your message
- Is a blue plot telling you something different from a black plot?
  ➜ Change it to black!!
- Use color-blind friendly colors & colors that don’t blind someone who doesn’t have a problem already! :)



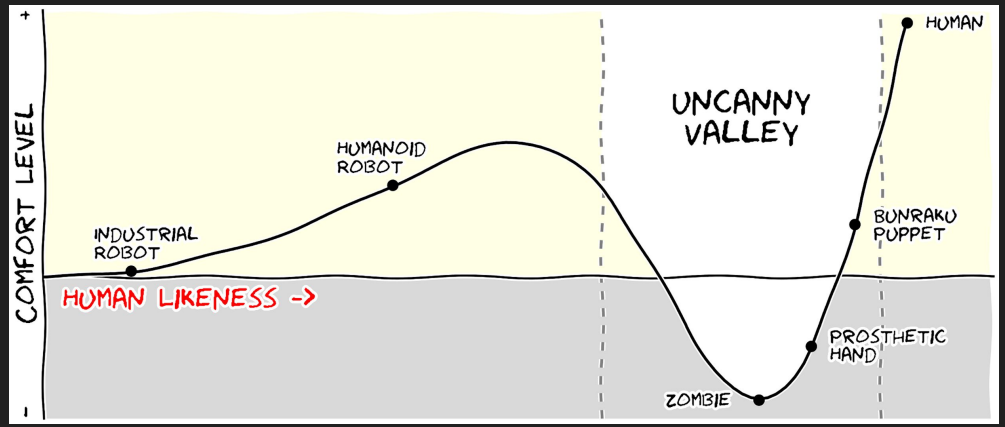
#9 Avoid ‘Chartjunk’

- Is the Pixel/area necessary to make a point?
- Is that chaos essential to your story?
- Are you having to do a lot of hand-waving and squinting?
- Or was it just a lazy solution to your plotting problem?



#10 Style over substance? No!!

- Data visualization, infographics, design → line gets thinner & thinner
- Make sure aesthetic doesn't win over content
- In science, **message & readability** come first! *then beauty*.



Get the right tool

GUI-based

- Omnigraffle ➜ for mac
- Inkscape ➜ professional vector graphics editor
- GIMP ➜ GNU image manipulation program

Specialized software

- Cytoscape ➜ networks
- Circos ➜ genomic data

Not afraid of a bit of code?

- R ➜ wide variety of stat. computing/graphics, highly extensible
- Seaborne ➜ python library primarily for 2D/3D plots
- D3.js ➜ data-driven documents JavaScript library

Examples

Reach out to me for specific experimental/computational ones.

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The talk!

Slides are just a guide to your talk; not the talk itself!

Before the talk

- Get feedback early on
  - ➜ that way you can think about someone other than you!
- Practice, practice, practice…
  - ➜ until you can *sleep-talk* your presentation!
- Anticipate Qs ➜ add As following your final slide
- Don’t bury your conclusions in your acknowledgements
  - ➜ Keep them separate! Both are important!
  - ➜ Add pictures of key people, if you could!

Will Ratcliff: David Attenborough style of scientific presentation

Practice & pace your talk

- Practice, practice, practice!
- Stay sentient of the time!
  - ➜ If it helps, pick a friendly face in your audience
  - ➜ and/or someone who'll tell you how you are doing with time

- Too little? Awkward & disconcerting. Water break?
- Too much? Disastrous! What just happened with that word storm?!

Scientific presentation: DA style of speaking!

- Mindset: Entertainer, not scientist!
- Tell a story: not just methods/results
- A solid scientific narrative
- Practice transitions
- Kill clutter
- Animations → show piecemeal
- Be excited!
- Be engaged!
- Jokes are tricky! More to lose than gain?!

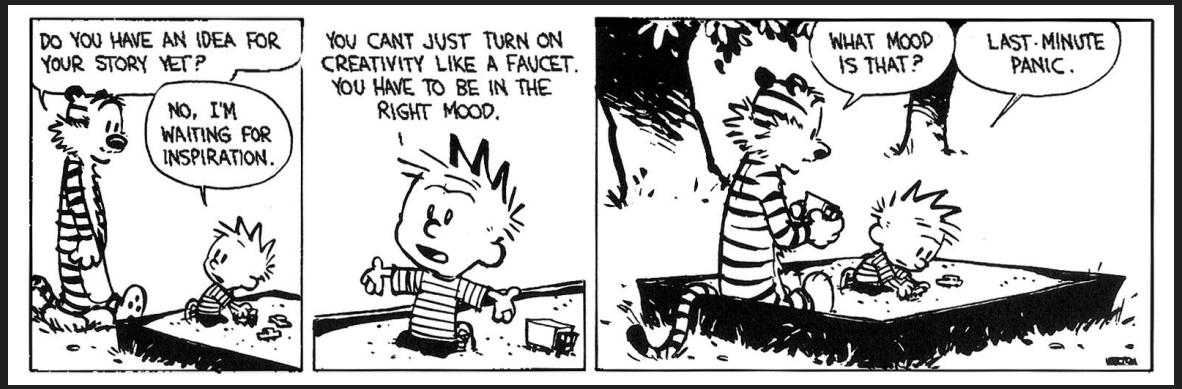
Will Ratcliff: David Attenborough style of scientific presentation

During the talk

1. Exploit your nervous energy!

   ➜ Convey your excitement/passion

2. Vocal variety
3. Appearance
4. Pauses
5. Body language



6. Be confident ➜ No one knows your talk better than you!

During the talk

- A thing or two about using pointers
- Reusing the outline slide ➔ gets everyone on the same page throughout ➔ chance to reiterate key takehomes
- Animations and transitions help you pace the talk
  ➔ Use animation in every slide
- Principle of parsimony of explanations (*esp.* lightning talks)
- Repeat critical messages twice & do it differently (*esp.* lightning talks)

The End ➔ Savor it!

- Don’t end abruptly & leave the audience hanging
- 2–3 slides to:
  - Summarize the central problem/idea and all your findings
  - Summarize highlights & key take-home messages
  - Provide context for why your results are important in the big picture
  - List papers/resources to read & follow-up
- Acknowledge key support, inspirations (often missed) & collaborators

Thank you but I’m still reachable

- Don’t end with “acknowledgements” or a slide that just says “Thank you” or “Questions”
- End with a slide that includes:
  - brief citation of all the main papers covered
  - any other talk or your own poster that’s being presented
  - your full name, affiliation, contact info, social media handles
  - links to webpages
  - any awesome awards/grants, and
  - information on jobs/opportunities (seeking or recruiting).

So, what have we learnt today?

- Logical outline
- Power of audience
- Power of simplicity
- Consistency is your friend
- Figures or text?
- Customized figures?
- Feedback
- Practice
- Share your story, share your passion!

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- Sri, Vilma & Linda @CVM
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- Nils Gehlenborg, Harvard Medical School

‘Official’ Presenters

- Steve Jobs, Sundar Pichai
- Hans Rosling, Ken Robinson
- Pixar, Ellen DeGeneres
- Attenborough, Lessig & Takahashi’s presentation styles

Thank you!

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JOIN US!

Resources

- **PLoS Computational Biology**
  ➜ [Ten Simple Rules for xyz] | Philip E Bourne
- **Elsevier**
  ➜ Dynamic scientific presentation
  Wiley
  ➜ Tips for giving a fabulous presentation
  Nature | Nature Jobs
  ➜ Scientific Talk | Scientific Presentation cheatsheet |
  10 biggest pitfalls in scientific presentations
- **Blogs on academic/scientific presentation**
  ➜ Matt Might, Will Ratcliff
  Hubspot, Forbes
  ➜ Types of presentation styles

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