Tips on Your Routine 15 Minute Scientific Talk

- Structure and presentation
- Slide theory
- Graph theory
Tips on Your Routine 15 Minute Scientific Talk

1. Consider your audience
2. Know and obey your time constraints
3. Use proper organization
4. Presentation is key
5. Create simple, clear slides
6. Be calm, casual, personable
7. Practice, practice, practice
1. Consider your audience

- beforehand, try to **determine the range of knowledge/familiarity** that your audience has with your research topic and speak to that level.

- audience will be comprised of a continuum of familiarity with your subject, so to engage most of them, keep it **simple**. This doesn’t mean to assume they are idiots, but downplay and define any jargon.

- speak to the “lowest level” in the audience.
2. Know and obey your time constraints

- know well ahead of time what your time limits are (i.e. talk versus question period)

- 15 min is very little time; plan to get no more than **2-3 ideas** across

- again, the necessity of **simplicity**

- avoid too many data slides (4-5 max.), but plenty of very simple introductory and transitional slides

- everyone hates when someone goes over the time limit but no one hates someone who ends early with more time for discussion
3. Use proper organization

A. Introduction

- start with **lights on** in conversational mode

- general question / big picture relevance (like a paper)

- educate audience of the state of knowledge on the subject, which motivates…

- use a **single slide or fade for each question** to emphasize it’s importance
3. Use proper organization

A. Introduction - continued

- indicate briefly where the talk is headed:

  “today I’m going to present the results of some experiments designed to answer each of these questions”

use a **slide that lists all of the 2-3 questions**.

- this slide will structure the rest of the talk and provide the transition from one question to the next (i.e. plan to make and use multiple copies).
3. Use proper organization

**B. Methods**

- really, really, **simple**! (audience can ask questions later)

- go with the flow created in the Introduction…

  state each **question** again, the **hypothesis** and **predictions**
  to be tested (this relates why you use the design and methods you are about to introduce)

- **study design** slide indicating what was manipulated and how, sample size can be indicated but not dwelled on

- **study design** slide should be **titled with the question** or hypothesis being tested (NOT “Experiment #1”)

3. Use proper organization

B. Methods continued

- figure of the **location of study** (if field work) and relevant environmental features

- slide(s) of the **species** involved in the study, their role, and relevant information that makes them appropriate for the study

- **photos** of doing stuff in the field or lab are a great way to convey methods as you verbally describe some details
3. Use proper organization

C. Results

- **slide titles**: present questions and/or results with data
- do not show more than **two graphs per slide unless simple temporal comparison** (e.g., “small multiples”)
- do not show more than **4 lines (preferably 3) per graph**
- do not show ANOVA tables
- Instead, include summary stats \((F, P, r^2)\) with graphs or tables (i.e. emphasize effect sizes)
3. Use proper organization

D. Conclusions / Summary

- recap by presenting the question, then your answer,
- verbally describe implications
4. Presentation is key

- **crack a joke** to break the ice as early as possible
- don’t make a stupid joke
- avoid **reading** notes or directly from slides, but rely more on…
- use slides for **transitions** and talk from your slides… design slides to guide you
- **practice makes perfect**, before a group that can give you constructive criticism
4. Presentation is key

- if constructing talk on a Mac, be sure to:
  1) save in PC version
  2) run entire presentation on a PC to be sure formatting and images work properly

- before meeting or session, be sure your presentation works on the projection system available

- at break before your talk, **familiarize yourself** with projector and pointer controls

- Don’t forget the “Blaufstein phenomenon”, or the mobile microphone
Slide Theory

1. Slide colors
2. Text
3. General design
4. Tables
5. Figures
6. Animation
Slide Theory

1. Slide colors

four philosophies: 1) black on white with some color
2) dark background with light text
3) Sexy (PowerPoint) background
4) Images as background

Often, light on dark has less contrast in well lit rooms

lighting conditions and personal preference

Often, light on dark has more contrast in poorly lit rooms
Slide Theory

1. Slide colors

- always maximize contrast
- use hues to direct focus of attention
- avoid white letters on light photo backgrounds
- avoid outrageous colors
- avoid too many colors
Slide Theory

1. Slide colors

- always maximize contrast
- use hues to direct focus of attention
- avoid white letters on light photo backgrounds
- avoid outrageous colors
- avoid too many colors
(3) Smaller-scale, more frequent events

(Year 2000)

Mid-water complex
n = 227

Benthic complex
n = 363

(Ammann unpublished)
Slide Theory

1. Slide colors
   - always maximize contrast
   - use hues to direct focus of attention
   - avoid white letters on light photo backgrounds
   - avoid outrageous colors
   - avoid too many colors
Here’s an example of poor text color placement

Dark Color looks awful

Using a light color over a dark part of the picture works better

But, this picture is so multicolored, that it doesn’t work well at all!
Acknowledgments

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Thank you to:
countless numbers of fur and blubber huggers
Slide Theory

1. Slide colors

- always maximize contrast
- use hues to direct focus of attention
- avoid white letters on light photo backgrounds
- avoid outrageous colors
- avoid too many colors
Presentation

Be aware of hideous or invisible color schemes

Mind the color blind!!!!
Slide Theory

1. Slide colors

- always maximize contrast
- use hues to direct focus of attention
- avoid white letters on light photo backgrounds
- avoid outrageous colors
- avoid too many colors
  - 3 - 4 colors max per slide
  - maintain similar colors throughout presentation
  - similar color schemes to (slides and graphs) to denote variables and treatments
Slide Theory

2. Text

- “fill the slide”
- large, bold and simple font:
  - minimum of 24 pt
  - Arial or Trebuchet MS as opposed to Times New Roman
  - two spaces between words
- **6 by 6 rule** (6 lines and 6 words per line)
- **minimize verbiage:**
  - don’t throw listeners into reading mode
  - phrases not sentences
Slide Theory

3. Organization slides

- Side bar “map” slides
- Transition slides
Slide Theory

3. Organization slides

- Side bar “map” slides
- Transition slides
Slide Theory

3. Organization slides

- Side bar “talk map” slides
- Transition slides

→ Question 1
→ Question 2
→ Question 3
Slide Theory

4. Tables

- **Avoid**... use a figure whenever possible!!
- title should relate to purpose of the data (avoid “Experiment 1” or “1999”)
- reconstruct (i.e. simplify) manuscript tables or figures
- summarize and minimize tables
- emphasize causality or relationships by **ordering** values to clearly show pattern (increasing or decreasing)
5. Figures

- avoid 3-D unless necessary
- draw attention to result being conveyed by:
  1) bold relationship relative to axes
  2) different colors for relationships and axes
- color and style code variables and keep consistent throughout talk
- avoid coding variables, instead label lines with text
Slide Theory

5. Figures

- emphasize “causal” relationships

- (organize data to clearly relate dependent and independent variables)

- provide comparison, provide some reference to time or space

- temporal comparisons must be summarized on same slide
Attrition of troops in relation to geographic distribution, direction, time, temperature, barriers (i.e. multivariate)
chart at left bears on the issue: Is there a time trend in O-ring damage? This is a perfectly reasonable question, but not the one on which the survival of Challenger depended. That issue was: Is there a temperature trend in O-ring damage?

O-ring damage index, each launch

26°–29° range of forecasted temperatures (as of January 27, 1986) for the launch of space shuttle Challenger on January 28

Temperature (°F) of field joints at time of launch
5. Figures

- emphasize “causal” relationships
- (organize data to clearly relate dependent and independent variables)
- provide comparison, provide some reference to time or space
- temporal comparisons must be summarized on same slide
Geographic Variation in Kelp Forest Fish Assemblages

SIMPROF (P = 0.01)
Graphics Theory

(Largely from seminar and books by Dr. Edward Tufte)

**Problem 1:** how to convey high dimensional data in a 2 dimensional world… “escaping flatland”

**Problem 2:** convey as much information as necessary without losing the major point
Graphics Theory

Tufte’s grand principles of graphic display:

1. Provide **comparison** and **reference**
2. Provide **causality**
3. Capture **multivariate complexity**
4. Motivation of display – **quality** of the data
5. **Convey change** over time **within the eye span**
6. **Maximize information content** per unit area of page
7. **Coordination and simplicity** for clarity
   (okay, Carr snuck in this last grand principle)
Tufte’s grand principles of graphic display:

1. **Provide comparison and reference**
   - Example: Joseph Minard’s graph of the trek of Napoleon’s army

2. **Context** is essential for graphical integrity
   - Example: insetting smaller scale patterns in larger scale context
     - “graphics must not quote data out of context”
     - temporal and spatial **reference**
     - arrows or shaded periods to emphasize temporal events
     - charts embedded in maps
Context is Essential for Graphical Integrity

To be truthful and revealing, data graphics must bear on the question of quantitative thinking: "Compared to what?" A good design should always provoke suspicion, by omission, leaving out data sufficient for context:

1. Must not quote data out of context.
2. Must not present data in a manner that hides important questions.

Imagine the very different interpretations other possible time paths surrounding the 1955-1956 change would have:

Comparisons with adjacent states give a still better context, revealing it was not only Connecticut that enjoyed a decline in traffic fatalities in the year of the crackdown on speeding:

Traffic Deaths per 100,000 Persons in Connecticut, Massachusetts, Rhode Island, and New York, 1951-1959

Tufte’s grand principles of graphic display:

2. Provide **causality**

   Example: Joseph Minard’s graph of the trek of Napoleon’s army

   Attrition of troops **in relation to** geographic distribution, direction, time, temperature, barriers

   - dependent variable on Y, independent variable on X.
   - order patterns in figures and tables according to dependent variable unless independent variable is ordered (e.g., latitude)

   another example: Challenger space shuttle… thinking causally but not showing it
Mid-water complex
Long larval duration
(3 - 4 months)

Kelp, Black-&-yellow, and Gopher rockfish

Benthic complex
Short larval duration
(1 - 2 months)

Olive, Yellowtail, and Black rockfish

Relative Abundance

Proportion

Lenarz et al. 1995 CalCOFI

El Nino

El Nino
(1998)
La Nina
(1999)
La Nada
(2000)
Mid-water complex
Long larval duration
(3 - 4 months)

Upwelling

Fish per 240 m³

El Niño
La Niña
Normal


Olive, Yellowtail and Black rockfish

Olive rockfish
Yellowtail rockfish
Black rockfish
Benthic complex
Short larval duration
(1-2 months)

Fish per 240 m³

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kelp rockfish</td>
<td>16</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Black-&amp;-yellow rockfish</td>
<td>8</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Gopher rockfish</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
(3) Smaller-scale, more frequent events

(Ammann unpublished)

May June July August

Number of fish per sampling unit

Benthic complex
n = 363

Mid-water complex
n = 227

Temperature (°C)

Year 2000

Mid-water complex

Benthic complex
n = 363

(3) Smaller-scale, more frequent events

(Ammann unpublished)
Tufte’s grand principles of graphic display:

3. Capture **multivariate complexity**

Example: Joseph Minard’s graph of the trek of Napoleon’s army

Attrition of troops in relation to:
- geographic distribution
- direction
- time
- temperature
- barriers

(i.e., 5-6 variables)
Tufte’s grand principles of graphic display:

4. Motivation of display – **quality** of the data

- quality reflected in content and reflects logic of the thinking
- we think causally and visually (pattern recognition), so design this way to help the thinking process
- poor design and display reflects lack of understanding of the information (i.e. failure of clear interpretation or pattern recognition)
- quality reflected in **resolution** of the data
Bigger fish produce far more larvae

- Approx. 11-fold increase
- Approx. 7-fold increase
Tufte’s grand principles of graphic display:

5. Convey change over time within the eye span
   (on same page or slide)
   - example: “small multiples” like frames in a movie
   - example: stacked size frequency distributions to convey growth
Graphics Theory

Tips more related to papers than talks…
Tufte’s grand principles of graphic display:

6. **Maximize information content** per unit area of page

A. balance presentation in text vs. figure or table.

- journals include figures and tables as part of the page limits, so try to strike an appropriate balance between words and data. (don’t waste figure on two data points!)

i.e., the classic…

Versus, “Mean Y of treatment level 2 (X ±1 SD = yada) was 90% greater than that of treatment level 1 (X ±1 SD = yada; F= , df= P= ).
Tufte’s grand principles of graphic display:

6. **Maximize information content** per unit area of page

B. Maximize data ink, minimize non-data ink.
   - don’t use 3-D unless necessary
   - eliminate non-necessary information or complexity
     example: Tukey’s “box plot”

  - this is also why you never have grids or shaded backgrounds in the “plot area” of a graph!
Tufte’s grand principles of graphic display:

7. For **clarity**…

- coordinate line style with symbol style
- coordinate symbols and lines across separate figures
Graphics Theory

Tufte’s grand principles of graphic display:

7. For **clarity**...

**Figure legends**

- for figures or tables, provide a legend that will allow the reader to understand what the data are all about (means, transformations, sample size).

- Legend **starts by summarizing the result** it is presenting

- Should be understandable without referring to text, if possible
Tufte’s grand principles of graphic display:

7. For **clarity**… Figure legends

Example:

**Don’t** - “Mean arcsine transformed percent mortality (individuals per day) plotted against mean +/- 1 s.e. (g) body weight for all sites”

**Do** – “The positive relationship between percent mortality and body weight”

Also,

- Units on axis, not in legend text
- Define error bars (std. error, std. dev., 95% CI)
PowerPoint Tips

- I do not use standard formats or “auto layouts”
  1) busy backgrounds distract from data and text
  2) formats restrict creativity
  3) e.g., easier to vary bulleted, adjust size and position

- can’t plot error bars easily, for this and other reasons, import figures as pictures (e.g., from Excel) then ungroup

- print “handouts” for practicing your talk!