How to Give Effective Scientific Presentations

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Part I

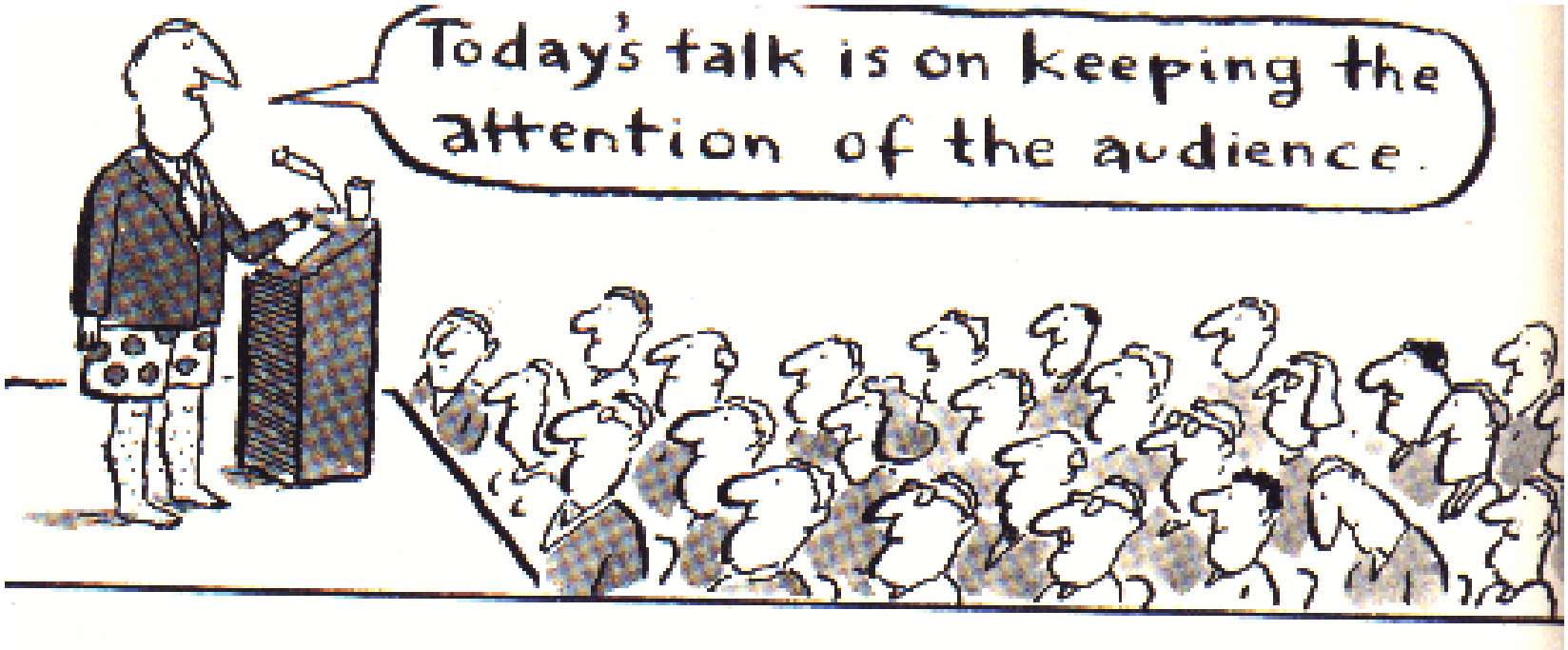
Introduction

Why Do We Give Presentations?

- Persuasive: Convincing your audience to follow a particular course of action.
- Instructional: Showing others how to perform a specific task (e.g., laboratory demonstration).
- Informative: Presenting new findings of information.

What Makes Giving a Presentation Difficult?

- One chance for the audience to hear.
- The audience cannot look up background information.
- The audience is restricted to the speaker's pace.
- Success is dependent upon the speaker's ability to deliver.
- Training on how to give scientific presentations is often not provided.


Today's talk is on keeping the attention of the audience.

Part II

Overcoming Our Fears

Activity #1

What are your fears when giving a scientific presentation?

My Fears

- Losing the audience's attention.
- Lacking sufficient material.
- Appearing too simple.
- Presenting work to a mixed audience.

A successful presentation starts with a confident speaker.

- Stay calm and relaxed.
- Know your material.
- Practice giving your presentation.
- You have a valuable message to share!

Part III

Structure: The Strategy You Choose

Figure: Boston subway.

Figure: Boston subway.

Maps and Presentations

- Every map has an intended audience.
- Maps are defined by what they include but are often more revealing in what they exclude.
- It is impossible to show everything!
- No matter how hard you try to include everything, there will always be something missing.
- However, whatever you decide to present should tell a story.

What Story Will You Tell?

- Remember, you will never be able to tell the full story.
- Instead, you must select the pieces that are the most relevant.
- But, how do you select what to present?

Activity #2

Imagine that you are packing for a trip. What will you bring?

I Need More Information!

- What is my destination?
- What is my purpose (e.g., vacation, business trip)
- How long will I be gone?

Packing and Presentations

- You wouldn't pack for a trip without knowing the destination and the intended purpose of the trip.
- Similarly, you should never give a presentation without considering your audience and their needs.

Thinking About Your Audience

- What does the audience know?
- What are they unlikely to know?
- What kind of talk would the audience find appealing?

My Audience

- Composed mostly of students.
- Has given or seen a scientific presentation.
- Interested in learning about giving effective presentations.
- May have been strongly encouraged (or forced) to attend by their advisor.

Part IV

Sample Presentation

What Does the Audience Want to Know?

- What's the Problem? (Introduction)
- What are You Doing? (Experiment and Method)
- What Have You Found and What Does It Means? (Results and Discussion)
- Take-Home Message (Conclusions)
- Who Did and Paid for the Work? (Acknowledgements)

Get rid of the outline slide!

- Motivation
- Your Algorithm or Methodology
- Experimental Results
- Conclusions
- Future Work

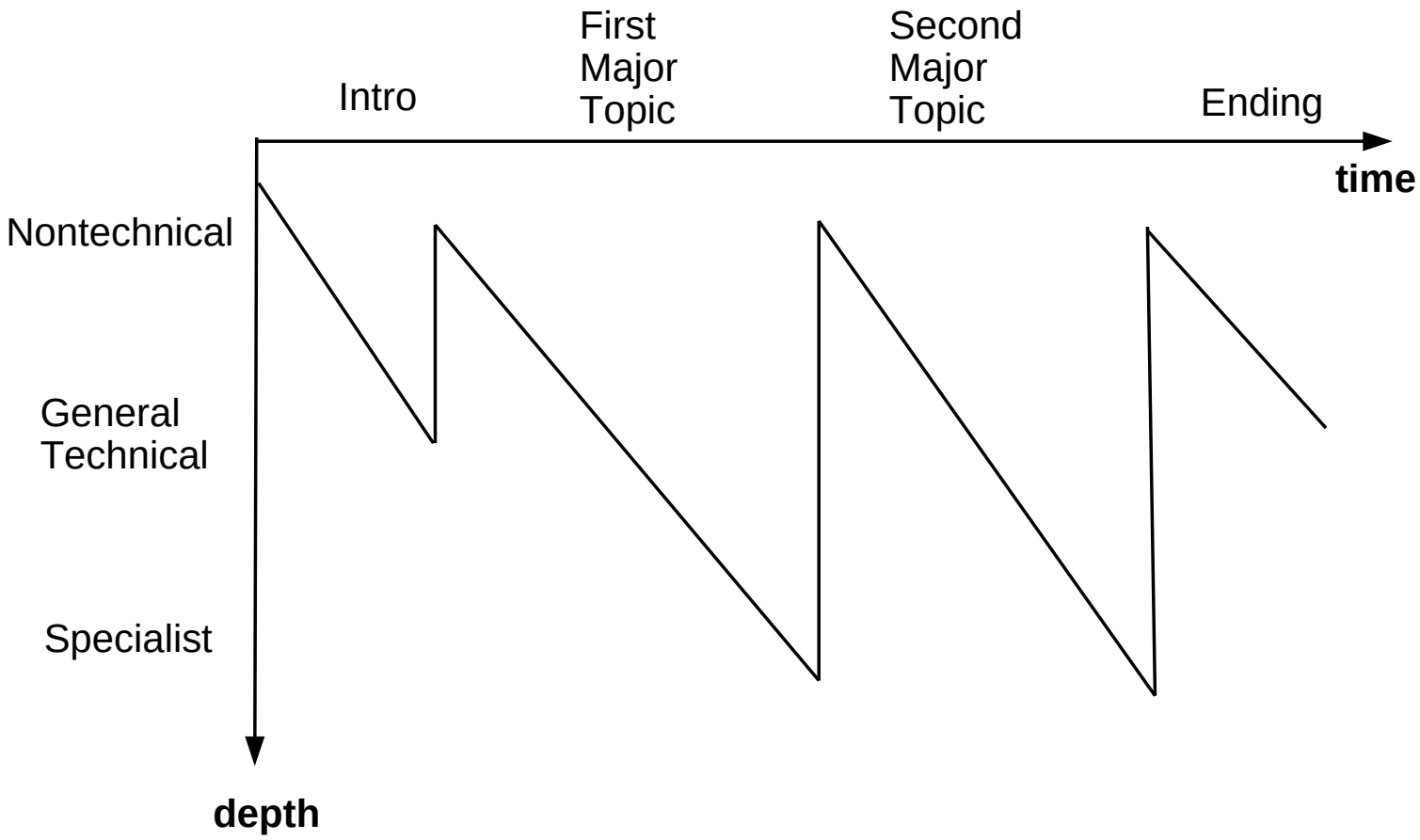


Figure: You can't please everyone all of the time. Adapted from *The Craft of Scientific Presentations* by Michael Alley.

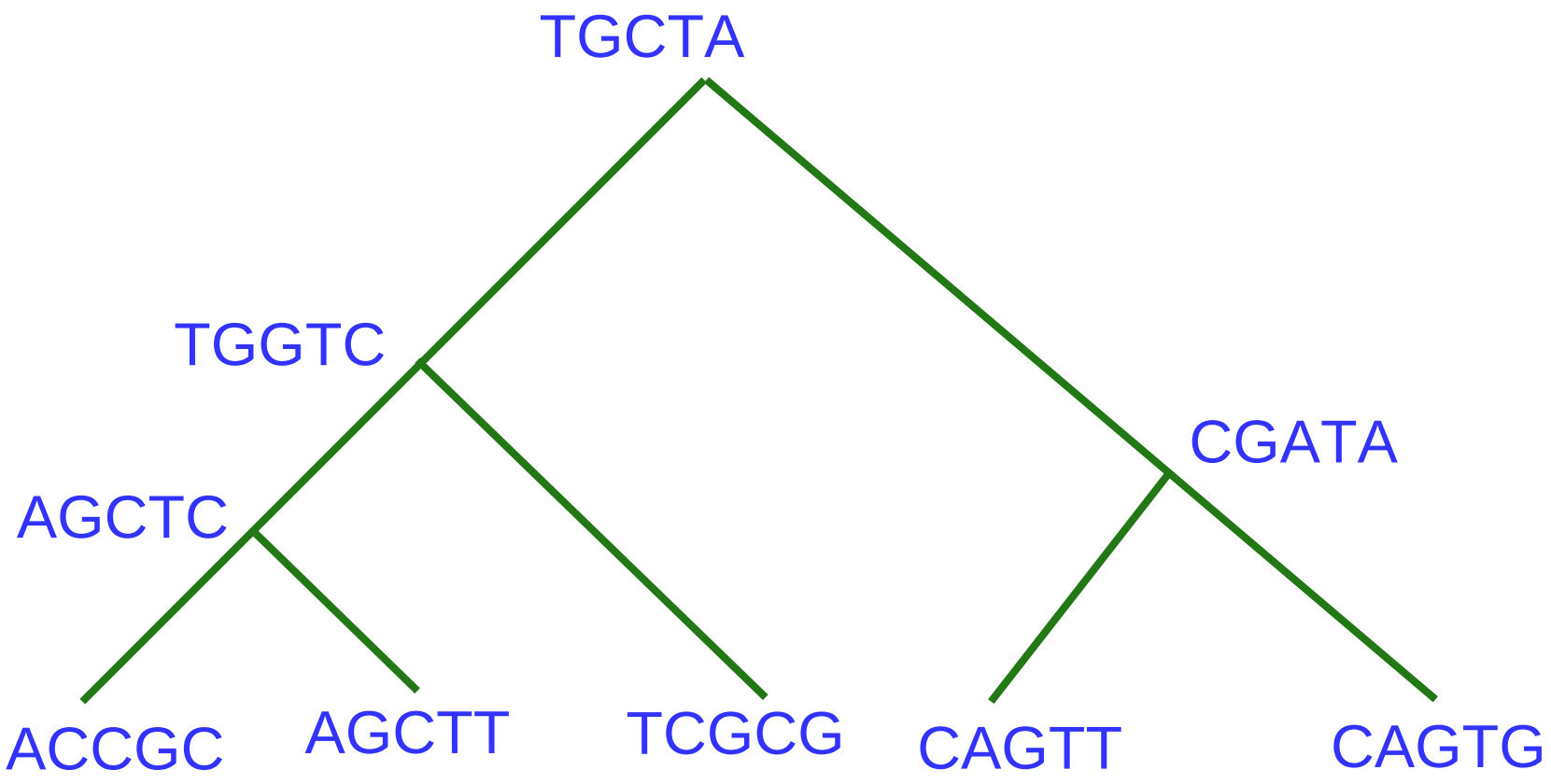
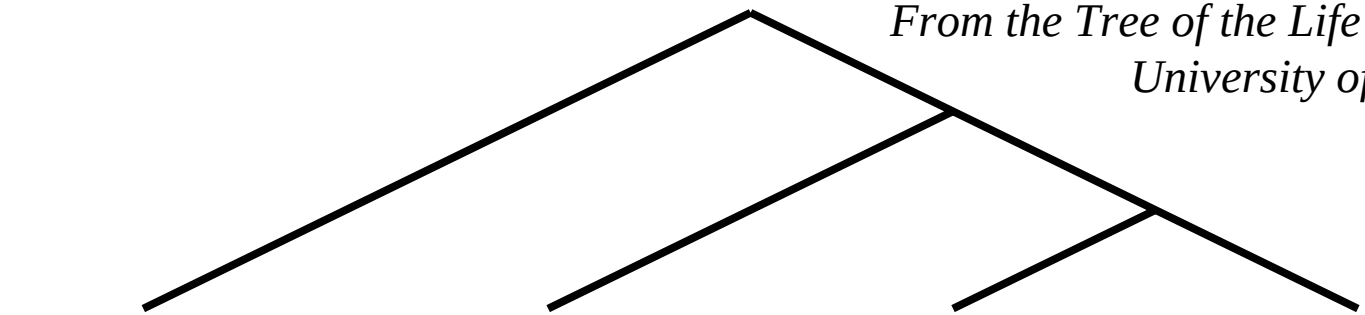


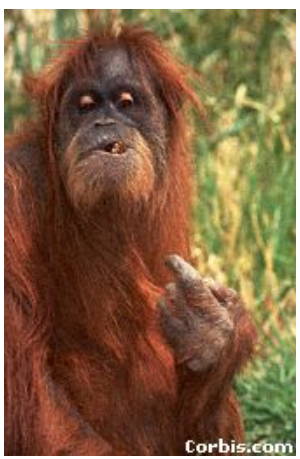
Figure: Phylogeny:Illustration.

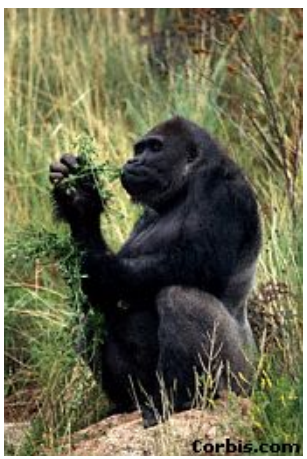
Phylogeny

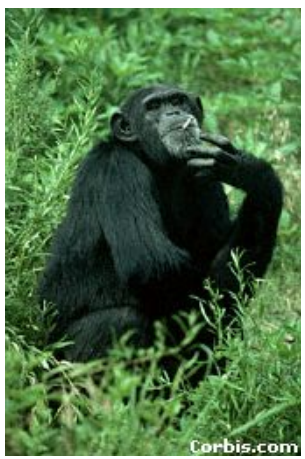
From the Tree of the Life Website, University of Arizona



Orangutan | Gorilla | Chimpanzee | Human







What's so hard about reconstructing a tree?

- We can't verify the answer! We are trying to predict the past.
- The number of possible trees for n organisms (or taxa) is $(2n-5)!! = 1 \times 3 \times 5 \times 7 \times \cdots (2n-5)$.
- How many possible hypotheses are there for 500 taxa?

Number of trees for 500 taxa

10115263685325330747401254553681418454595359510317781744132676057535454002735423992318512085072928145218884567245490607840519954833466355583535774897970040488815238277723582878977888382708387952037965433544269211828401766893376514629774129032149142218846193421132252049055375593012849142094308373147370285391157545909279018754173903977953996826046937270975490715396772421321330161921124267771175704211686027803024642439328260468392827754470200402452543974531262594085593604535178135943392523278766824038954305972077351521308492843654640247563403088568287605128256977179202099707223089815051317939694639452214215920834938466434696225612010448373091648554310277269854544957753694279678784102798171834203423525108091236373325249540955497555931327278246538062105531433627228716687006415903433927701492566149996512053769159206143282569961825679289449540190063388055536023941824129563864282806414365187707162038985041357086832700682397983941700757189186043108313759376530512797174869681041814022717379990154461252973088476955059773636344130787807618909374495551180362103518068667271167900757173144225324351085431750766379789465160656973715801599304814797313830584946561944060908605783954511999189168873949202592120506151537933468640482772925564408650345171736262273043394087451171875

What do we do now?

- The problem isn't going away.
  - Grand Challenge problem: *Tree of Life*
  - Evolutionary history of all known species on the planet (estimates between 10 to 100 million)
- We need heuristics!
  - Recast as a optimization problem.
  - Optimization criterion of interest: maximum parsimony

Remainder of Presentation

- What am I Doing? (Experiment and Method)
- What Have I Found and What Does It Means? (Results and Discussion)
- Take-Home Message (Conclusions)
- Who Did and Paid for the Work? (Acknowledgements)

Part V

Visual Aids: Your Supporting Cast

Presentation Software

- PowerPoint
  - The most frequently used software for creating presentations.
  - “Power corrupts. PowerPoint absolutely corrupts.” – Edward Tufte
- Keynote (only available on Mac OS X)
- Latex-based tools
  - Prosper
  - Beamer (used for this presentation)

Keep It Short and Simple (K.I.S.S.)

- Some people cannot resist the temptation to assert their mathematical superiority.
- Consider the following equation

$$ln(e) + \sin^2 x + \cos^2 x = \sum_{n=0}^{\text{inf}} 2^{-n}$$

and its more “trivial” form

$$1 + 1 = 2.$$

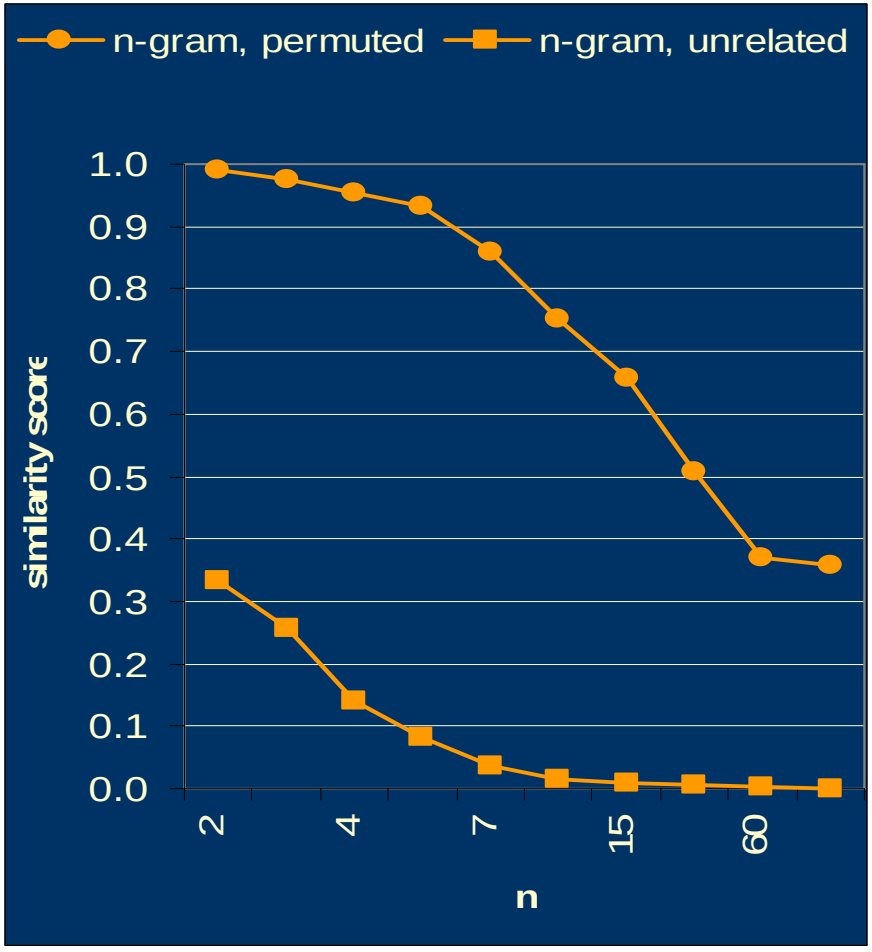


Figure: A poorly designed plot.

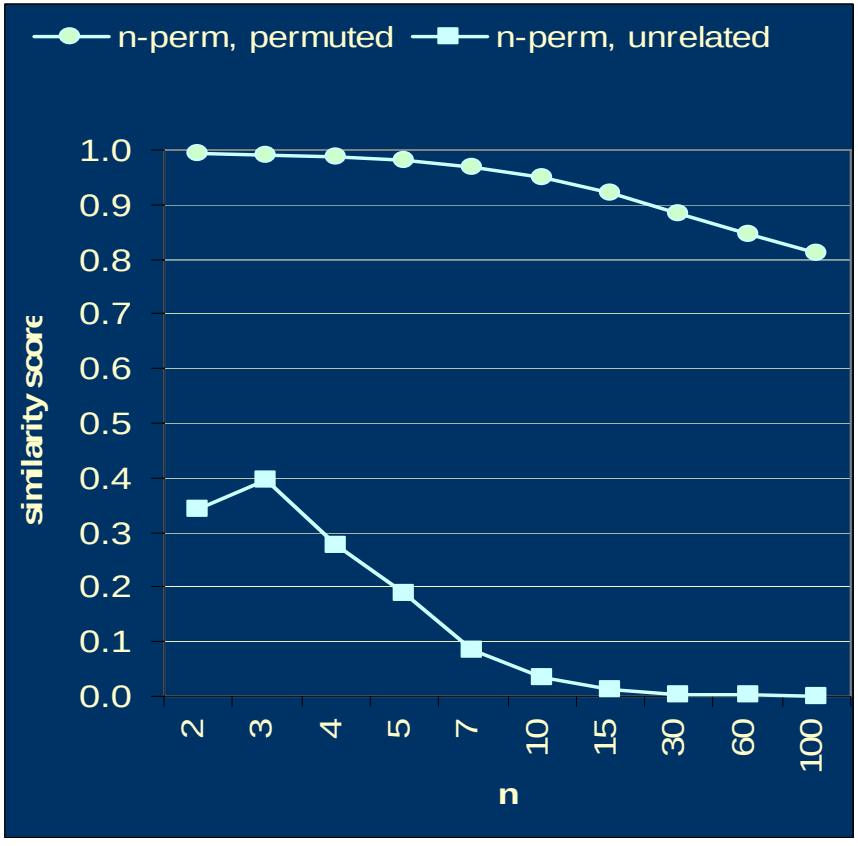


Figure: Another poorly designed plot.

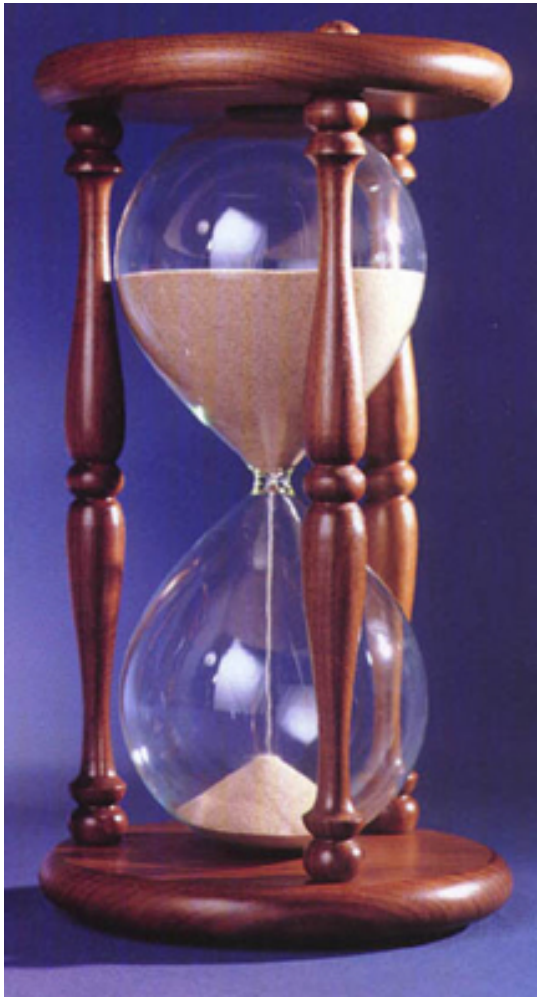
Part VI

Delivery: It's Showtime!

Speech

- Show enthusiasm.
- Speak freely.
- Speak clearly.
- Speak slower than you would in a normal conversation.
- Make sure you are speaking the audience's language.

Don't go over your allotted time!



Handling Questions

You say: That's a very interesting question.
You mean: You obviously didn't listen properly.

You say: I'm glad you raised that point.
You mean: I'll say it again, so listen this time!

You say: I'm afraid I don't know the answer to that one.
You mean: Why did you have to ask that? It's irrelevant here.

You say: Yes, the additional experiments you suggest are very appropriate.
You mean: I don't care about running more experiments. I simply want to graduate!

Don't forget ...

- You are the expert!
- A few people ask questions to be obnoxious.
- Many people ask questions because they are interested in your work.
- The sign of a good presentation is a lively discussion afterwards.

Part VII

Wrap-Up

Summary

- The key to an effective presentation is concern for your audience.
- Don't overwhelm them, but don't underwhelm them either.
- Say what you need to say and sit down. Everyone's internal clock is ticking.
- Relax, stay calm, and remember you are the expert!

References

- Michael Alley, *The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors to Avoid*, 2003.
- Claus Ascheron and Angela Kickuth, *Make Your Mark in Science*, 2005.
- Edward R. Tufte, *The Cognitive Style of PowerPoint*, 2003.
- Peter Turchi, *Maps of the Imagination: The Writer as Cartographer*, 2004.
- Justin Zobel, *Writing for Computer Science*, 2004.

Thank you for your attention