How to Give a Good Scientific Talk

Christian Theobalt

Graphics, Vision & Video – Interdisciplinary Topics in Visual Computing
SS 2012
Outline

- Structuring your story
- Preparing your data/information
- Preparing and giving the presentation
- Concluding your presentation
- Questions and answers
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Presentation Structure

- **Basic rule**
  - Say what you are going to say
    - 1-3 main points in the introduction
  - Say it
    - Give the talk
  - Then say what you said
    - Summarize main points in the conclusion
  - Don’t try to build suspense and then unveil a surprise ending

http://www.safetyoffice.uwaterloo.ca/hspm/tools/images/scaffold_stair.png
Tell a Story

- Prepare your material so that it tells a story logically
  - Subject: title, authors, acknowledgements
  - Introduction / overview/ motivation
  - Method/approach
  - Results/information/analysis
  - Conclusion/summary

- Use examples, anecdotes, and significant details

- Create continuity so that your slides flow smoothly
  - Guide the audience through your story
  - Your last point on one slide can anticipate the next slide

http://www.cgd.ucar.edu/cms/agu/scientific_talk.html
The Story

- Common mistake: too much material
- Remember: You will never be able to tell the full story
- You must select pieces that are most relevant
- A lot of this talk – guidelines on how to select
Audience

- Why and to whom are you giving this presentation?
- What do you want the audience to learn?
  - Think about this as you construct your talk
  - Edit your slides -- delete what is unnecessary, distracting, confusing, off point
Audience

- Goal depends on audience → structure

- Scientific conference
  - People with background in subject
  - More technical detail
  - Message:
    - Novelty of your results
    - How does it improve over existing methods
    - Teach the main idea → inspire people to read the paper
Audience

- Goal depends on audience → structure

- Popular talk
  - People with no background
  - Less technical detail
  - Message:
    - Importance of your research
    - Main findings and social impact
    - Get funding, getting people interested in science
Is a Slide Needed or Not?

- Two important points
  - Is it part of the story I want to tell?
  - Will the audience understand and value this point?
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Presenting Your Methods, Data, and Results

- **Methods, Instrumentation**
  - Instrumentation: For most talks, only present the minimum
  - Methods: core part – explain main points clearly

- **Tables / Figures / Videos**
  - Support structure visually → Overview
  - Support explanation of methods and technical concepts
  - They are the results – in particular in visual computing
  - Make the talk more interesting

- **Math**
  - Effective “language” – but use with care
Overview

Figures...

- Create a summary figure with major findings, or an illustration of the processes or problem
  - Consider showing it at the beginning and the end
  - Consider showing it during the talk as a guide
- You can use web sources for figures (reference source !)
- Also good for motivation: why is a problem important?
Summary / Overview Figure

- Logical flow of information and main steps
- Consistent terminology throughout talk

- Variant: Block diagram

```
Input  →  Name of Step I  →  Name of Step II  →  Output
```
Summary / Overview Figure

- Variant: Augment blocks with explanatory pictures re-used later in the talk
Summary / Overview Figure

- Overview figure as guide shown during talk
- Tells the audience: where are we?
- Picks up people that “got lost”
- Optional: highlighting
Summary / Overview Figure

- Overview figure as guide shown during talk
- Tells the audience: where are we?
- Picks up people that “got lost”
- Optional: highlighting

![Diagram showing steps: Input, Name of Step 1, Name of Step 2, Results]
Figures to Explain Technical Concepts

- Often easier to understand than text
- Often support your explanation better than text
  - Build figures up as you speak
  - Make sure you reserve enough time for it

Pinhole camera [Wikipedia]

BRDF [vetcite.org]
Figures to Explain Technical Concepts

Why's a picture worth a thousand words?

Hmm... How fast do you type? About 23 words per minute.

That's it! When I finish my drawing in 40 minutes...

...you would have already typed 2000 words!
Figures to Explain Technical Concepts

- **4 stroke engine operation**
  - *The engine four main strokes to its cycle:*
  - The first stroke, called the **intake stroke**, the crankshaft pulls down the **piston** by rotating. The **intake valve** is open at this point in the cycle, and air will be pulled through the **intake manifold** into the motor. After this is complete the **camshaft** rotates to the low spot on the lobe. This allows the **valve spring** to close the intake valve.
  - The second stroke is called the **compression stroke**. This is because it compresses the **fuel/air mixture**. While this is happening the intake and exhaust valves are closed…

[www.enginebasics.com]
Figures to Explain Technical Concepts

The 4 Stroke Cycle

1) Induction
2) Compression
3) Ignition (Power)
4) Exhaust

[www.enginebasics.com]
Results: Videos / Software

- Often actual results in visual computing
  - Make sure *before the talk* that videos / software play with the presentation equipment (projector etc.)
  - Use common codecs
  - Stay in control
    - Explain the results - don’t play videos and be silent (unless there is a voice over in the video)
    - Speed of video should match your explanation
    - Sometimes better cut videos into pieces (one per slide) rather than playing long video
Results: Data Tables / Figures

- Tables are useful for a small amount of data
- Include units
- Indicate data source if they are not your own
- But tables are often used badly …
### Discharge of the Esopus Creek (Coldbrook, NY) and precipitation at Slide Mountain, NY (source: USGS/NCDC)

<table>
<thead>
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<th>discharge (cf/s)</th>
<th>precipitation (in/day)</th>
</tr>
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</tbody>
</table>
Esopus Creek

Discharge of the Esopus Creek (Coldbrook, NY) and precipitation at Slide Mountain, NY (source: USGS/NCDC)
Preparing Your Data, continued

- Figures
  - ‘1 figure ≈ 1000 words’
  - Figures should be readable, understandable, uncluttered
  - Keep figures simple, use color logically for clarification
    - Red=bad, green=good
    - Invisible color
    - Meaning attached to colors (color blindness is more common than you think)
  - Explain axes and variables
  - Include reference on figure

Using Math

- People are used to study equations, not to see them for 2 minutes on a slide
- Equations should support your explanation, not harm it
- Common mistake: too many equations!
- Use them as little as possible…
- …and as much as needed
- Don’t use them to impress people or show how hard the problem you talk about is
- Use only important equations, take time, explain properly
Equation Example

- If needed, properly explain each element

\[ \Psi(L) = \sum_{i \in I} \left( \phi(D | l_i) + \sum_{j \in N_i} (\phi(D | l_i, l_j) + \psi(l_i, l_j)) \right) \]
Equation Example

- If you say: ‘to solve the problem we look for the minimum (or maximum) of the following energy function…’

\[
\Psi(L) = \sum_{i \in I} \left( \phi(D|l_i) + \sum_{j \in N_i} (\phi(D|l_i, l_j) + \psi(l_i, l_j)) \right)
\]

- and then you superficially explain each symbol → run risk to lose people’s attention quickly
Equation Example

- A slide overloaded with formalism is usually not going to work well

\[ \Psi(L) = \sum_{i \in I} \left( \phi(D|l_i) + \sum_{j \in N_i} (\phi(D|l_i, l_j) + \psi(l_i, l_j)) \right) \]

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Equation Example - Better

- Build equation up on slide, e.g., an error function and / or
- Explain components on conceptual level
  - Why is that component part of the error function?
- Combine with figures
- Still explain most important mathematical insight
- Refer for details to paper – but know (!) the details, in case there is a question
Equation Example – Alternative Presentation

- Instead support by figures and explain main concepts

\[
\Psi(L) = \sum_{i \in I} \left( \phi(D|l_i) + \sum_{i \in N_j} (\phi(D|l_i, l_j) + \psi(l_i, l_j)) \right)
\]

- Color term + shape prior
- Smoothness

Segmentation

Person A, Person B
Outline

- Structuring your story
- Preparing your data/information
- Preparing and giving the presentation
- Concluding your presentation
- Questions and answers
Preparing the Presentation

- Average not more than 1 slide per minute
- MS Powerpoint is now standard
  - If you use something else, be careful to check it in advance
- No sounds unless part of results!
  Some logical animations good
- Use 3-7 bullets per page
  - Avoid writing out, and especially reading, long and complete sentences
- Slide appearance (font, colors) should be consistent
- Speelcheck 😊
What Font to Use

Type size should be 18 points or larger:

18 point
20 point
24 point
28 point
36 point

AVOID USING ALL CAPITAL LETTERS
BECAUSE IT'S MUCH HARDER TO READ

* References can be in 12-14 point font
Color

Dark letters against a light background work

Dark letters against a light background are best for smaller rooms, especially when the lights are on for teaching

Color

Light letters against a dark background also work.

Many experts feel that a dark blue or black background works best for talks in a large room.

Preparing Yourself...

- The way how you present yourself is as important as your slides
- Immerse yourself in what you are going to say
  - Web of Science/Google it: use the latest news
- Make sure you are familiar with the projection equipment, remote control and Powerpoint
  - Bring your presentation on a memory stick AND a laptop with power supply AND an extension cord, test equipment in presentation room …

www.terryfoxttheatre.com/theatre_specification...
What to Wear …

- Dress up – maybe wear a jacket?
  - More formal attire makes you appear more authoritative and you show you care enough to try to look nice

- From “Ask Dr. Marty” AnimalLabNews (Jan-Feb 2007)
  - Dark clothes are more powerful
  - Shirts or blouses with collars are better than collarless ones
  - Clothes with pressed creases (!) are signs of power

- Dress-code in CS (and this seminar 😊) usually casual
  - But being properly dressed is always positive

[taken from imdb.com]
Print Your Slides

- Don’t read the presentation
- Print out copies of your slides (‘handouts’)
  - You can annotate them and use them as notes
  - You can review them as you’re waiting
  - If everything crashes – the bulb blows, you can still make your main points in a logical way
  - Alternative: presenter mode – know how to use it!

www.com.msu.edu/.../powerpoint/printing.htm
Rehearsing

- **Practice – actually stand up and say the words out loud**
  - You discover what you don’t understand
  - You develop a natural flow
  - You come up with better phrasings and ways to describe things
    - It is harder to explain things than you think, practicing helps you find the words
  - Stay within the time limit
  - Try speaking too loud to get a feeling where the upper limit is

- **Don’t over rehearse or memorize the talk**
  - The first practice things will improve at least 10 fold -- the second will make things twice as good -- the third may add a bit of polish, but from there it can easily get worse

Giving the Presentation

- Nervousness is normal
- Starting out is the hardest part of the talk
  - To get going, memorize the first few lines
  - “Hello, I’m Christian Theobalt. The title and subject of my talk is “how to give a good talk”. Through this presentation I want to give you a few hints and guidelines about how to prepare and give a scientific presentation”
Giving the Presentation

Experienced speakers:
- Speak freely and look directly at audience
- Key points and outline given by presenter

Inexperienced speakers:
- Put outline and key points of your presentation on your slides
- Helps you remember
- Key points are there for people who weren’t listening or who are visual learners
- Presenter mode: notes in presenter view, but don’t read them out loud, use own words (exception – language proficiency)

http://www.metclubnyc.org/slide%20show.jpg
Giving the Presentation

- Stand where the figures can be seen
- Look at people during presentation
- Be enthusiastic
- Don’t worry about stopping to think
- Don’t rush
  - Figure out which slide is your half-way mark and use that to check your time

http://www.dvd-photo-slideshow.com/screenshot/01.gif
Giving the Presentation

- Don’t apologize or make comments about yourself
  - “I hope you’re not bored”
  - “I was working on this ‘til 3 am”
- Don’t overuse the pointer
- Don’t try to be cute and don’t force being funny
- Don’t forget acknowledgements, always give proper credit
  - Tip: Everyone in the audience has come to listen to your lecture with the secret hope of hearing their work mentioned
  - Reference sources
Giving the Presentation Continued

- Imagine yourself seen from the perspective of the audience
  - Don’t continuously wander around the room
  - Don’t jiggle change in your pocket
  - Don’t overdo the use of hand gestures
  - Raise the pitch of your voice at the end of sentences
  - Speak a little slower than in a normal conversation
    - During presentation you are nervous and will speak faster, force yourself to pause after some sentences
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Concluding Your Content

- Announce the ending so that people are prepared
  - For example, with a slide titled “Conclusions”
  - Or by saying, “In my final slide …” or “My final point is …”
- Have only a few concluding statements
- Come back to the big picture and summarize the significance of your work in that context
  - Extend logically beyond your limited study – but don’t overreach
- Open up new perspective (could be another slide)
  - Describe future work, raise questions, potential implications

Finishing Your Presentation

- Think carefully about your final words and how to finish your presentation strongly
  - Don’t just drift off … “I guess that’s all I have to say …”
  - You may want to actually memorize your ending lines, just as you do your starting points

- Ending your talk
  - Say “Thank You” … pause for applause … then
  - Say: “Any questions?”
What Can Go Wrong?

- Uncertainty about material
- Interruptions
- Running out of slides
- Running out of time

http://www.rcpsych.ac.uk/.../anxiety/images/grap6.jpg

Uncertainty About the Material

- Try to structure your talk so that you are sure about the material you present
- If you have to address something important that you are unsure of
  - Acknowledge the gap in your understanding
    - “I’m working on it” or “I’m looking into it”
  - This is better than being pressed to admit something
  - Also it may very well be an open question
- Another way to handle this is to raise it as a question yourself

From *What’s so Funny About Science?* by Sidney Harris (1977)
Minor Interruptions During Your Presentation

- Don’t look irritated or rushed
- Answer – briefly – just enough to straighten it out
  - Then carry on with your presentation without checking back
- A question that you will answer later in your talk?
  - Say “Good point; just wait two slides”
- Requires a long answer and is not critical understanding?
  - Say “Good point; I’ll come back to it at the end of the talk.”

Major Interruptions During Your Presentation

- If most in the audience are non-specialists
  - Explain the issue to the audience
  - Delay discussion until after the talk

- If most of the audience is knowledgeable
  - Make your point as clearly as you can
  - Discuss it out – don’t try to diminish or avoid it
  - Still, keep an eye on the time and defer to “discussion offline” if necessary

Running Out of Slides

- Short talks are better than ones that are too long
  - Of course, if all main points were covered
- What to do:
  - Don’t make a personal comment
    - “hum, I’m running out of slides …”
  - Stretch it a little -- see if you can think of an example, or story, to bolster your points
  - Conclude unhurriedly, summarizing your main points, but don’t be repetitious


Running Out of Time

“He cannot speak well that cannot hold his tongue”
Thomas Fuller, 1732, *Gnomologia*

- Avoid this – impolite to other speakers and the audience: if it happens …
  - Do not assume that you can carry on past your time
  - Do not skip all of your slides looking for the right one to put on next
  - Include shortcuts (action buttons that jump to conclusions)
  - Conclude – on time wherever you are in your talk -- by making your main points
    - In Powerpoint you can just type the number of your concluding slide and press Enter to skip right to it

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Questions and Answers

- Questions after your talk can be difficult but they definitely help you in writing up your research / report
  - Identifies parts the audience did not understand
  - Focuses and adds dimension to your analysis
- You can repeat the question
  - This gives you time to think
  - The rest of the audience may not have heard the question
  - Also if you heard the question incorrectly, it presents an opportunity for clarification

http://www.erp.wisc.edu/profdev/Talkhandout05.doc
http://www.firekills.gov.uk/seniors/cool/howstart/images/howstart.gif
Questions and Answers, continued

- Keep your answers short and to the point – don’t respond with another lecture
- Don’t say that a question is bad, or that you addressed it already
  - Rephrase it into something that you want to talk about
- Never demean the question or questioner
  - They may have friends in the audience, and you never need more enemies
  - The research world is smaller than you think and you will continue to encounter people throughout your career

http://www.erp.wisc.edu/profdev/Talkhandout05.doc
http://www.cartoonstock.com/newscartoons/cartoonists/ato/lowres/at6893i.jpg
Difficult Questions

- Usually you have thought more about the material than anyone else -- this puts you in a stronger position than you may think

- Anticipate typical questions and prepare for them
  - Generalizability of your findings to other other conditions, other data?
  - Methodological bias? Limitations? Exceptions? Priorities?

- Still concerned about questions?
  - Make extra slides – perhaps on details of instrumentation or methodology

http://www.regislasvegas.org/images/class-pic-hand-raised.jpg
Difficult Questions, continued

- If you really don't know the answer
  - Say "Interesting, I will look into that" or “That’s a good point, let’s discuss it afterwards”
  - Don't feel that you have to invent an answer on the fly -- you are only human and you can't have thought of everything

- If the questioner disagrees with you and it looks like there will be an argument then defuse the situation
  - "We clearly don't agree on this point, let's go on to other questions and you and I can talk about this later"

- As a seminar student
  - You are not expected to know everything, but certainly what you can have learned from the papers

http://www.erp.wisc.edu/profdev/Talkhandout05.doc
Seminar Specifics: Moderating the Discussion

- Different from Conference Talk
  - Much more time after talk – around 40 mins.
  - Conversation in group to identify strengths/weaknesses/open questions

- Prepare a set of points to discus, such as:
  - weaknesses / limitations of methods (extra slide(s))
  - Comparisons between papers you read (extra slide(s))
  - Propose improvements / extensions
    - Ask other participants what they think and about their ideas
  - Build bridges to other talks in the seminar
  - Points you were unclear about while reading the papers

- Remember: the discussion is very valuable for the report
Conclusions

- Structure your content in a way that is comfortable for you and your audience
- Filter out core aspects and build convincing story
- Use your own style to your advantage
- Use figures / videos / maths appropriately
- Think ahead about where you might encounter difficulties and figure out ways to overcome them → “Live rehearsal” very important
Material Sources

- Many slides from:
  - *How to Give a Good Talk* by Stephanie Pfirman, Cornell University

- Also ideas from:
  - *How to give Scientific Presentations*,
    Tiffiani Williams, Texas A&M University
    [http://faculty.cs.tamu.edu/tlw](http://faculty.cs.tamu.edu/tlw)
Resources

- Luca Aceto, Aalborg University and Olivier Danvy, “Aarhus, Denmark”
- Michigan State University Graduate Student Organization
  - [http://www.fw.msu.edu/orgs/gso/documents/GSOWorkshopDocsSp2006/PresentationTipsinPowerPoint.ppt#428,1](http://www.fw.msu.edu/orgs/gso/documents/GSOWorkshopDocsSp2006/PresentationTipsinPowerPoint.ppt#428,1)
- Susan Herzog, Eastern Connecticut State University
  - [http://www.easternct.edu/smithlibrary/library1/presentations.html#ppt](http://www.easternct.edu/smithlibrary/library1/presentations.html#ppt)
- Heather Heying, Evergreen
  - [http://academic.evergreen.edu/H/heyingh/downloads/givingatalk.pdf](http://academic.evergreen.edu/H/heyingh/downloads/givingatalk.pdf)
- Mark Schoebel and Brian Toon
  - [http://www.cog.ucar.edu/cms/agu/scientific_talk.html](http://www.cog.ucar.edu/cms/agu/scientific_talk.html)
- U John Cairns, Jr., *BioScience Vol. 39 No. 9*
- CD-Condensed Matter Journal Club
- Meshnick SR, Eaton JW., City College, CUNY Medical School,
- How to give a job talk
  - [http://www.psychologicalscience.org/observer/getArticle.cfm?id=2046](http://www.psychologicalscience.org/observer/getArticle.cfm?id=2046)
  - [http://chronicle.com/jobs/2001/03/2001033002c.htm](http://chronicle.com/jobs/2001/03/2001033002c.htm)
Thank you!