Creating beautiful presentations

Ryan Johnson

With special thanks to:
Natassa Ailamaki, CMU CALCM lab, Markus Püschel

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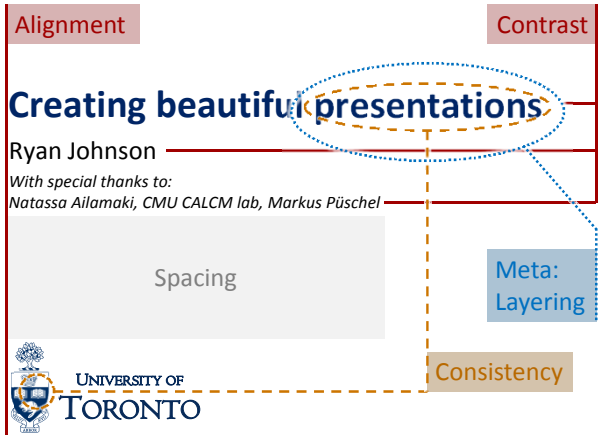

Does this stuff really make a difference?

Counter-example

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Why do we Care about Presentations?

- In contrast to a paper or other technical writing, you present your work and yourself
- People remember good presentations:
  - Good content
  - Well presented
  - Well-designed slides
- Many of my colleagues and I put a lot of effort into each presentation, and at the beginning of a career it's even more important

What's wrong here?

This slide (and all others with red headings) by Markus Püschel

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Not enough spacing: Hard to read

Contrast should be improved

Contrast could be improved

Random (and bad) placement of text: Looks messy

What's wrong here?

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Why do we Care about Presentations?

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- People ***remember*** good presentations:
  - Good content
  - Well presented
  - Well-designed slides
- Many of my colleagues and I ***put a lot of effort*** into each presentation, and at the beginning of a career it's even more important
- ***Presentations are very important***

What's wrong here?

Too much text + only text
Conflicts with you talking (more later)

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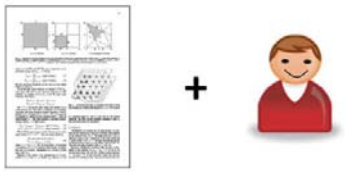
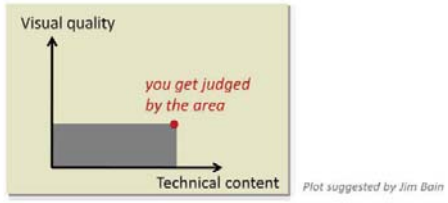
Presentations Are Very Important

- You present your work and yourself



- People remember good presentations:



Plot suggested by Jim Bain

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Presentations Are Very Important

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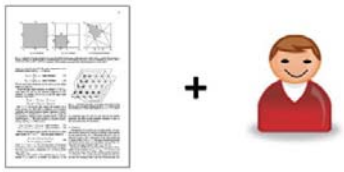
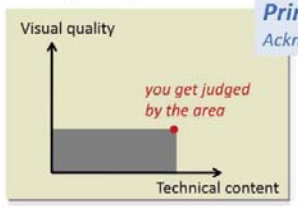


- People remember good presentations:

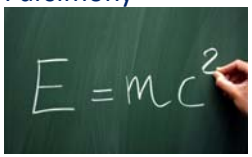


Plot suggested by Jim Bain

Principle: Acknowledgment
Acknowledge external sources

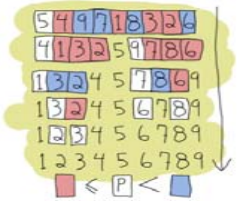
An effective talk is beautiful

Parsimony



Source: hplusmagazine.com

Elegance



Source: franzejr.files.wordpress.com

Perspective

Achieving beauty requires skill and effort

Architecture and craftsmanship matter

Cambodian shantytown

Source: suite-22.com

New York brownstones

Source: 4.bp.blogspot.com

Toronto beaches

Source: Google street view

Which kind of talk do you want to give?

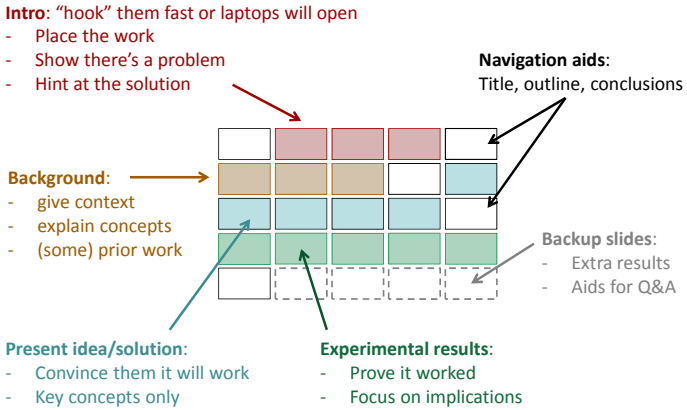
Designing a beautiful talk

- What is beauty?
- Architecture (= functionality)
  - Know what you want to transmit
  - Floor planning an effective talk
  - Know your audience (and your enemy)
- Craftmanship (= sparkle)

Technical Content

- **Communicate:**
  - Motivation
  - Problem statement
  - Main idea
  - Main result
- **Do not (try to) communicate:**
  - Every detail of your work
- **Why?**
  - Because people cannot digest much information that quickly
  - You are lucky if they remember anything from your talk
- ***How to get across?***

Floor planning a 30 minute talk



Too many slides = death. Be ruthless.

Slide titles are prime real estate

- Space is limited. Get right to the point!
- Use slide content to prove your point
  - Graphs, figures, equations, etc.
  - Span multiple slides as needed
- Punch line underscores implications
  - Tell the audience why they should care
  - Lead audience into the next slide
- Common pitfall: put claim in punchline

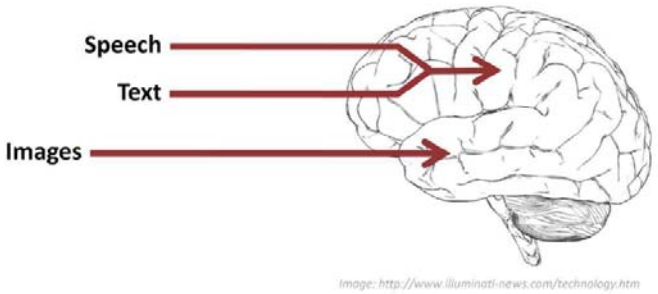
Bonus: helps build strong story line

Know your audience

- Conference talk?
  - Transmit "the juice" of your talk
  - Convince them to read your paper
- Job talk or potential collaborator?
  - Tailor-made "story" is key
  - Prove your work is relevant to their interests
- Keynote?
  - General audience (avoid hairy details)
  - Open their eyes to broad trends and implications

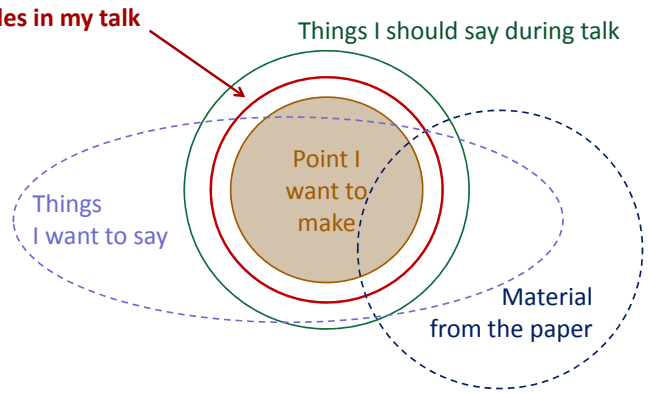
Know Your Enemy

You can't read and listen at the same time



Every aspect of talk must reflect this one fact

What belongs in the talk slides?



Good slides = self-propelled talk

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Designing a beautiful talk

- What is beauty?
- Architecture (= functionality)
- Craftmanship (= sparkle)
  - Slides
  - Figures
  - Equations
  - Graphs
  - Tables

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Colors

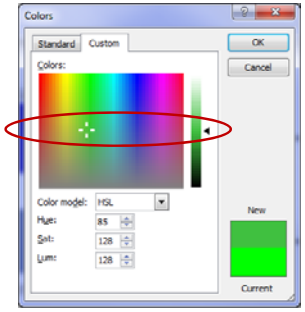
Colors

Colors: Basics

- **Use color**
  - Pick a few colors and stick with them (consistency)

Avoid fully saturated

Choose somewhat desaturated



Warm Colors Dominate, Cool Colors Recede

- That's why in text *red* works better than *blue*
- But for boxes it is the other way round

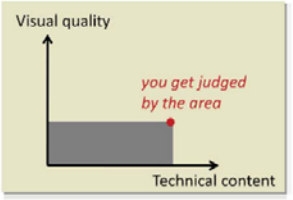
- For areas/boxes: try desaturated bright (= pastel) colors

- An outline in the same color, but darker, can look good

- But also dark boxes (again, desaturated) can make sense

The Looks (The Design)

- **As important as content**
- **Design includes**
  - Basic layout
  - Fonts
  - Colors
  - Graphics
  - Data presentation: Viewgraphs, tables
- **Basic layout**
  - Keep it simple (don't clutter with logos etc.)
  - *Be consistent*
  - Black text on white background, or
  - Bright text on dark background



Fonts

- **Basics:**
  - Serif font: ergonomic for large text blocks (books)
  - Sans-serif: better readability for short text blocks

M serif
M sans serif

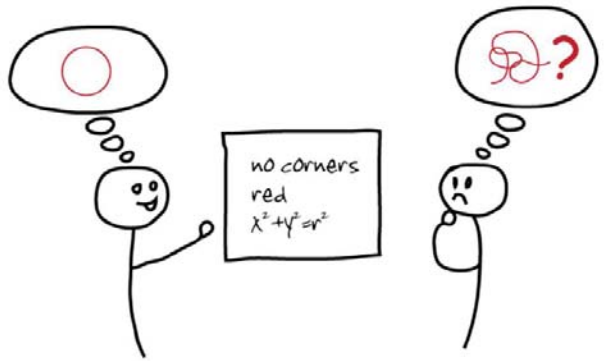
- **Use a sans-serif font**
  - *Powerpoint: use Calibri* (this talk)
  - Arial is less attractive
  - Arial Narrow is less attractive
  - `For code Courier bold is best`
  - **Don't use this font for technical talks**
- **Use only one or two fonts and be consistent**

Basic Tips

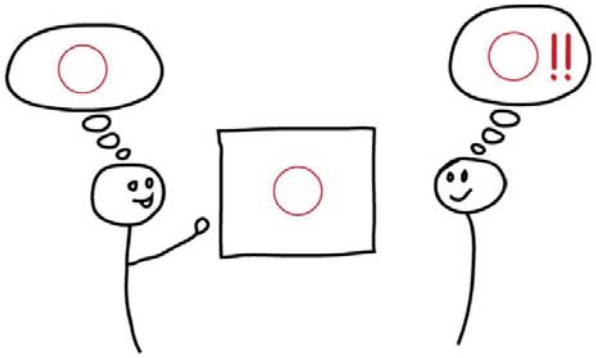
- **Use Office 2007, it's worth it**
- **Use Slide Master to set basic appearance**
  - View → Slide Master
- **Set "Snap objects to grid:" simplifies placement**
  - Home → Arrange → Align → Grid Settings
- **Use ruler to align text with bullets**
  - View → Ruler, then pull tab stops
  - Avoids things like

    •This is some text inside a
    bullet and badly aligned
- **Shift-enter for line break without new bullet**

Don't just talk about it ….

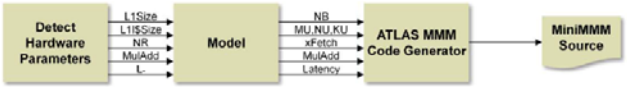


… show it!

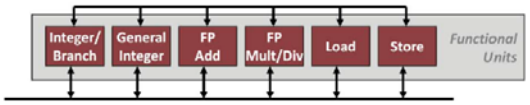


Simple Examples

- **Process: Block diagram**



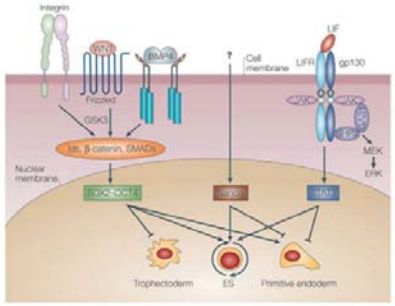
- **System: Block diagram**



Visualization in Biology

- **Complex process:**

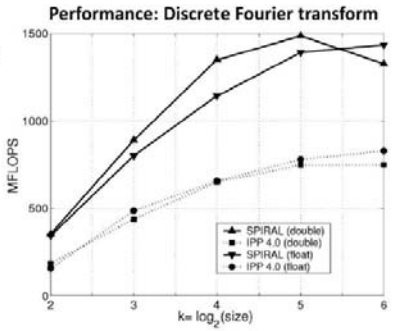
Combinatorial signaling pathways involved in maintaining mouse ESC pluripotency.



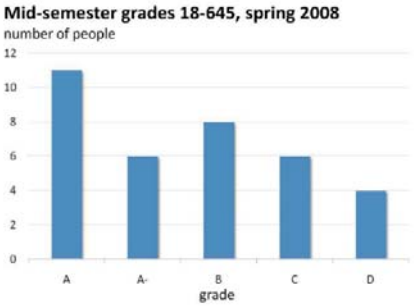
Source: Nature Reviews Molecular Cell Biology vol. 6, no. 11, pp. 872-881, 2005

How to Present a Viewgraph: Example

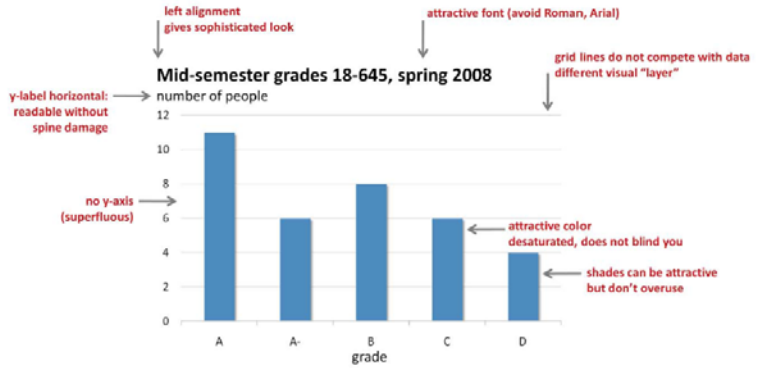
- **Start like this:**
  - We compare the performance of Spiral and IPP
  - The x-axis shows …., the y-axis shows
  - This means higher is better (or vice-versa)
  - For example, this datapoint means that ….
- **Now you can explain more**
- **Then conclude**
- ***But this plot is rather mediocre …***



Example I: Good Viewgraph

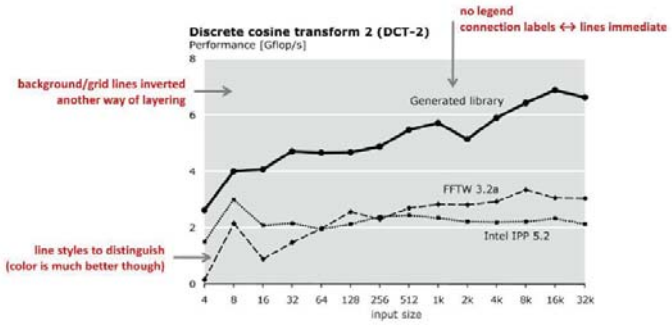


Example I: Good Viewgraph



Principles used: *Alignment, contrast, layering*

Example II: Good Viewgraph

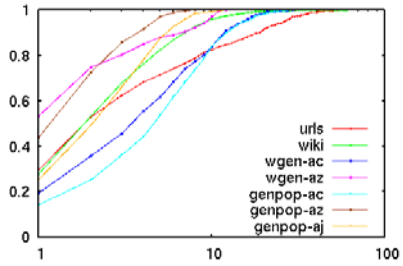


Graphs should aid interpretation

Offender: www.marketwatch.com

Y-axis intercept:
0 (1 if log-scale)

Use log log-scale:
- when range spans 2+ orders of magnitude
- to highlight ratios instead of differences



Use scatterplot if x axis is numeric... *especially* when samples are unevenly spaced

Which One Looks Better?

signal processing concept	algebraic concept (coordinate free)	in coordinates
filter	$h \in \mathcal{A}$ (algebra)	$\phi(h) \in \mathbb{C}^{t \times t}$
signal	$s = \sum s_i b_i \in \mathcal{M}$ ($\mathcal{A}$-module)	$\mathbf{s} = (s_i)_{i \in I} \in \mathbb{C}^I$
filtering	$h \cdot s$	$\phi(h) \cdot \mathbf{s}$
impulse	base vector $b_i \in \mathcal{M}$	$\mathbf{b}_i = (\ldots, 0, 1, 0 \ldots)^T \in \mathbb{C}^I$
impulse response of $h \in \mathcal{A}$	$h \cdot b_i \in \mathcal{M}$	$\phi(h) \cdot \mathbf{b}_i = (\ldots, h_{-1}, h_0, h_1, \ldots)^T \in \mathbb{C}^I$
Fourier transform	$\Delta : \mathcal{M} \to \bigoplus_{\omega \in W} \mathcal{M}_\omega$	$\mathcal{F} : \mathbb{C}^I \to \bigoplus_{\omega \in W} \mathbb{C}^{d_\omega}$ $\Leftrightarrow \phi \to \bigoplus_{\omega \in W} \phi_\omega$
spectrum of signal	$\Delta(s) = (s_\omega)_{\omega \in W} = \omega \mapsto s_\omega$	$\mathcal{F}(\mathbf{s}) = (\mathbf{s}_\omega)_{\omega \in W} = \omega \mapsto \mathbf{s}_\omega$
frequency response of $h \in \mathcal{A}$		$(\phi_\omega(h))_{\omega \in W} = \omega \mapsto \phi_\omega(h)$

signal processing concept	algebraic concept (coordinate free)	in coordinates
filter	$h \in \mathcal{A}$ (algebra)	$\phi(h) \in \mathbb{C}^{t \times t}$
signal	$s = \sum s_i b_i \in \mathcal{M}$ ($\mathcal{A}$-module)	$\mathbf{s} = (s_i)_{i \in I} \in \mathbb{C}^I$
filtering	$h \cdot s$	$\phi(h) \cdot \mathbf{s}$
impulse	base vector $b_i \in \mathcal{M}$	$\mathbf{b}_i = (\ldots, 0, 1, 0, \ldots)^T \in \mathbb{C}^I$
impulse response of $h \in \mathcal{A}$	$h \cdot b_i \in \mathcal{M}$	$\phi(h) \cdot \mathbf{b}_i = (\ldots, h_{-1}, h_0, h_1, \ldots)^T \in \mathbb{C}^I$
Fourier transform	$\Delta : \mathcal{M} \to \bigoplus_{\omega \in W} \mathcal{M}_\omega$	$\mathcal{F} : \mathbb{C}^I \to \bigoplus_{\omega \in W} \mathbb{C}^{d_\omega} \Leftrightarrow \phi \to \bigoplus_{\omega \in W} \phi_\omega$
spectrum of signal	$\Delta(s) = (s_\omega)_{\omega \in W} = \omega \mapsto s_\omega$	$\mathcal{F}(\mathbf{s}) = (\mathbf{s}_\omega)_{\omega \in W} = \omega \mapsto \mathbf{s}_\omega$
frequency response of $h \in \mathcal{A}$	n.a.	$(\phi_\omega(h))_{\omega \in W} = \omega \mapsto \phi_\omega(h)$

Easy decision, isn't it?

Most Important Guidelines for Making Tables

- Avoid vertical lines
- Avoid "boxing up" cells, usually 3 horizontal lines are enough: above, below, and after heading (see examples in this guide)
- Avoid double horizontal lines
- Enough space between rows
- If in doubt, align left

Example: Before and After

Before:

	abstract	realized
shift operator	q	$T_1(x) = x$
shift operation	$\diamond$	$\cdot$
space mark	t_n	C_n
k-fold shift operator	$T_k(q)$	$T_k(x)$
space shift	$q \diamond t_n = \frac{1}{2}(t_{n+1} + t_{n-1})$	$x \cdot C_n = \frac{1}{2}(C_{n+1} + C_{n-1})$
signal	$\sum s_n t_n$	$\sum s_n C_n(x)$
filter	$\sum h_k T_k(q)$	$\sum h_k T_k(x)$

also the first column gets a header

everything left aligned

three horizontal lines only, I like the top and bottom ones bolder

After:

concept	abstract	realized
shift operator	q	$T_1(x) = x$
shift operation	$\diamond$	$\cdot$
space mark	t_n	C_n
k-fold shift operator	$q_k = T_k(q)$	$T_k(x)$
space shift	$q \diamond t_n = \frac{1}{2}(t_{n+1} + t_{n-1})$	$x \cdot C_n = \frac{1}{2}(C_{n+1} + C_{n-1})$
signal	$\sum s_n t_n$	$\sum s_n C_n(x)$
filter	$\sum h_k T_k(q)$	$\sum h_k T_k(x)$

more space between rows

space to the left edge removed

space to the right edge removed

Example Tables

Price of privilege

Minimum wealth required to be in:
2000, $

Top 50%	2,161	Top 10%	61,041
Top 40%	3,517	Top 5%	150,145
Top 30%	6,318	Top 1%	514,512
Top 20%	14,169		

Source: World Institute for Development Economics Research

Not enough

Women as % of German newspapers':

	readers in 2006	top editorial positions
Dailies		
Süddeutsche Zeitung	44.0	13.0
Frankfurter Allgemeine Zeitung	36.0	6.25
Handelsblatt	25.0	0
Die Welt	37.0	31.0
FT Deutschland	32.0	25.0
Weeklies		
Der Spiegel	34.0	0
Focus	36.0	16.7
Stern	48.0	16.0
Die Zeit	43.0	16.5
Wirtschaftswoche	20.5	0

Sources: Medien-Analyse ag.ma; Newspapers; *The Economist*

***The Economist*'s house-price indicators**

% change

	Latest	Q3 2006 on a year earlier	1997-2006
Denmark	23.3	18.7	115
Ireland	14.2	6.2	252
Canada	12.8	4.3	69
South Africa	12.7	20.7	327
France	12.5	15.5	127
Sweden	12.0	9.5	123
Belgium	11.8	20.0	118
Spain	10.8	13.4	173
New Zealand	9.6	14.9	94
Australia	9.5	1.7	132
Britain	9.8	2.7	192
United States	7.7	12.7	100
Singapore	7.6	3.3	na
Italy	6.6	7.3	88
Netherlands	6.2	5.3	97
China	5.4	5.5	na
Switzerland	2.0	0.8	16
Germany	-0.8	-1.3*	-1*
Hong Kong	-2.1	20.3	-44
Japan	-2.7	-5.4	-32

*2004 †1997-2005

Sources: ABSA; Bulwien ESRI; Japan Real Estate Institute; Nationwide; Neelmma; NVM; OFHEO; Quotable Value; Stadim; Swiss National Bank; government offices

Equations can be deadly

Work sharing performance model:

$$x(M,n) = min\left(\frac{1}{p_{max}}, \frac{n}{\sum_{k<\phi} p_k + p_\phi(M) + \sum_{\substack{m \in M \\ k>\phi}} p_{k_m}}\right)$$

Barrage of symbols and terms

No time for proper explanation

Masks big picture

Performance depends on two factors:

$$Throughput = f\left(\frac{1}{TotalWork}, \frac{1}{CriticalPath}\right)$$

Improved by work sharing

Worsened by work sharing

All terms useful and understandable

Presentation highlights point

Be nice to your audience: parsimony is key

Principles for a beautiful talk

- Presenting well is *very* important
  - Only one chance to make a first impression
  - Gives you a real edge over all those bad presentations
- Understand the enemy
  - Bored audiences tune out
  - Overloaded audiences tune out
  - Excessive text/detail = overloaded and bored audience
- Parsimony:
  - Everything in the talk drives some point
  - Eliminate extraneous details

Books That Influenced This Talk

- Cliff Atkinson, ***Beyond Bullet Points***, Microsoft Press, 2005
- Nancy Duarte, ***Slide:ology***, O'Reilly, 2008
- Stephen Few, ***Show Me the Numbers***, Analytics Press, 2004
- Edward Tufte, ***Beautiful Evidence***, Graphics Press, 2006
- Edward Tufte, ***The Visual Display of Quantitative Information***, 2nd edition, Graphics Press, 2006
- Garr Reynolds, ***Presentation Zen***, New Riders, 2008
- Dan Roam, ***The Back of the Napkin***, Portfolio, 2008
- Robin Williams, ***The Non-Designer's Design & Type Books***, Peachpit Press, 2008
- http://pages.cs.wisc.edu/~markhill/conference-talk.html

Acknowledgments

- Slides with red backgrounds © Markus Püschel
  - His guides have vastly improved my talks
  - ***Small guide to giving presentations*** (http://www.ece.cmu.edu/~pueschel/teaching/guides/guide-presentations.pdf)
  - ***Small guide to designing tables*** (http://www.ece.cmu.edu/~pueschel/teaching/guides/guide-tables.pdf)
  - I have modified slightly some of his slides
- Natassa Ailamaki
  - Taught me what to (and not to) put in a talk
  - Taught me to put claims at the top of the slide
- CMU CALCM lab
  - Masters of the powerful intro
  - Patiently shredded my talks until I learned to do them right