How To Give Strong Technical Presentations

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Principle: Contrast

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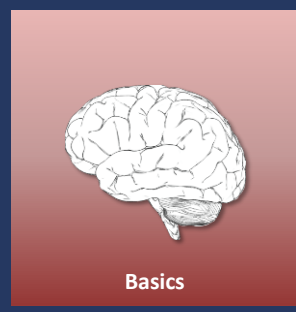
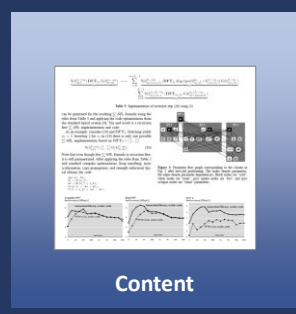
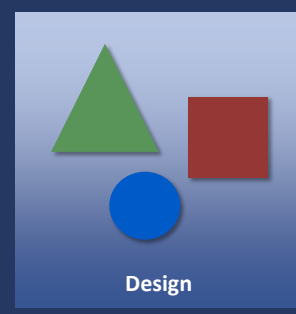
Principle: Alignment







Presentations Are Very Important

- In contrast to a paper or other technical writing, or a simple interview, you present your work and yourself
- People remember good presentations:
  - Good content
  - Well presented
  - Well-designed slides
- You need to put effort into each presentation—it is worth it

Deficiencies?

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No space

Bad contrast

Bad alignment

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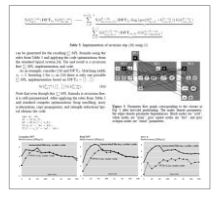
  - Well-designed slides
  - Well delivered
- **You need to *put effort* into each presentation—it is worth it**

Deficiencies?

Presentations Are Very Important

- **You present your work and yourself**



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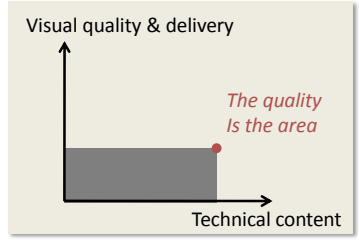
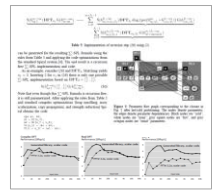
- **People remember good presentations**



Plot suggested by Jim Bain



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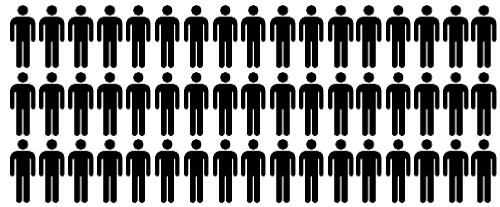


Biological Fact I: Text Versus Images

Speech
Text

Verbal channel

Images

Visual channel

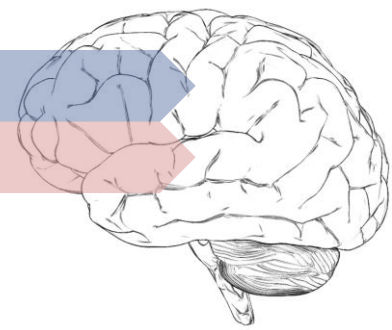


Image: http://www.illuminati-news.com/technology.htm

You cannot read and listen at the same time

Ideally

You talking — *Verbal channel*

Slides — *Visual channel*

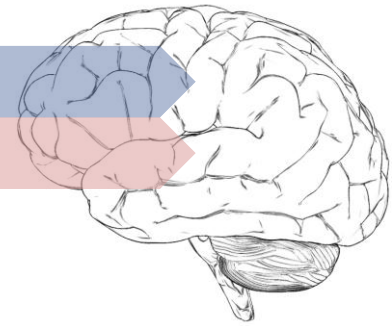


Image: http://www.illuminati-news.com/technology.htm

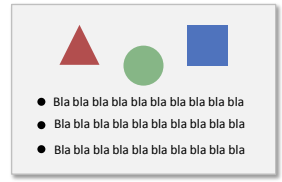
Handling the Medium

"Teleprompter"

- Bla bla bla bla bla bla bla bla bla bla
- Bla bla bla bla bla bla bla bla bla bla
- Bla bla bla bla bla bla bla bla bla bla
- Bla bla bla bla bla bla bla bla bla bla
- Bla bla bla bla bla bla bla bla bla bla

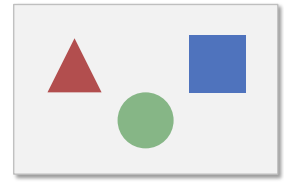
Really bad

"Slideument"



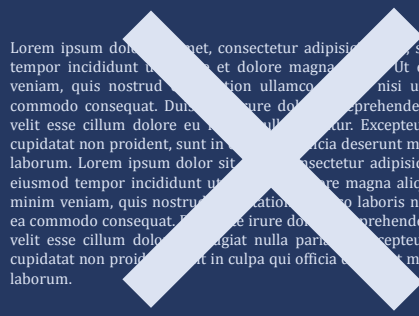
Better

Presentation



Ideal
(not always possible)

Nancy Duarte, Slide:ology



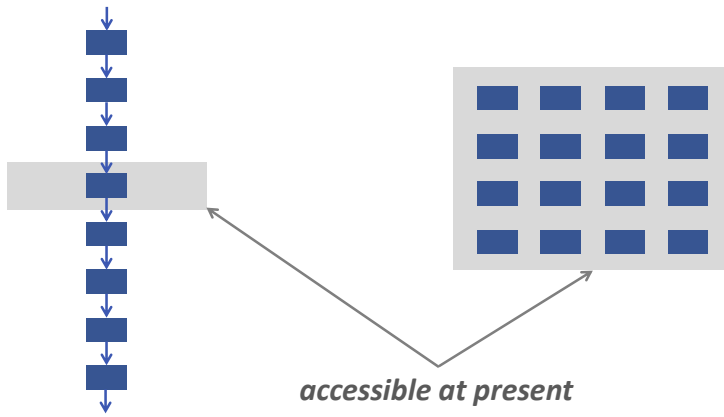
Minimize Text

Good presentation slides
are not self-contained

Fundamental Weakness

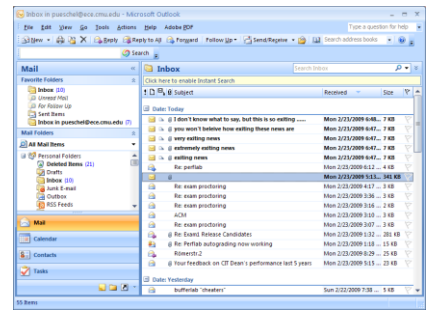
Presentations are temporal …

… not spatial (as written documents or posters)



Know Your Enemy

+



facebook

YouTube

NZZ Online

A few minutes boring
=
The audience is gone

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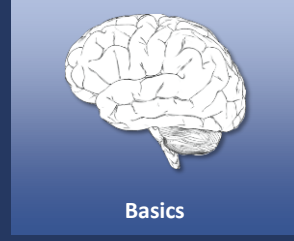
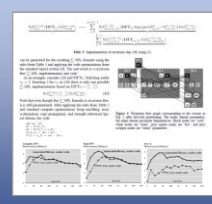
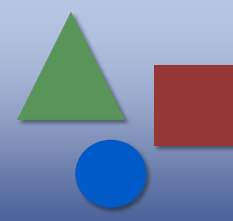


Basics

Preparation & Delivery



Content



Design

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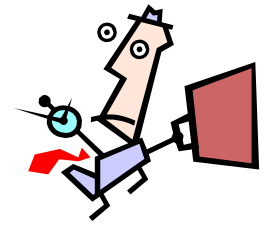
Preparation: Invest Time And Effort!

- *Do not prepare your talk in the last minute*
  - Not cool
  - Usually: you slacked
  - Result: "Teleprompter presentation"



- **Every presentation is important**
  - Always give your best
  - Otherwise you don't know how to do it when it counts

You in Front of the Audience

- **Use a remote mouse (free talking)**

- **Start:**
  - Introduce yourself
  - *Acknowledge your co-authors!*
    Say their names
    Maybe put pictures

- **Look at the audience not the slides**
  - Focus on different people

External Material

- **Everything included with copy-paste:**
  Images, graphics, text (even if only one sentence)
- ***Acknowledge on the same slide!***
  bottom right, gray is one option

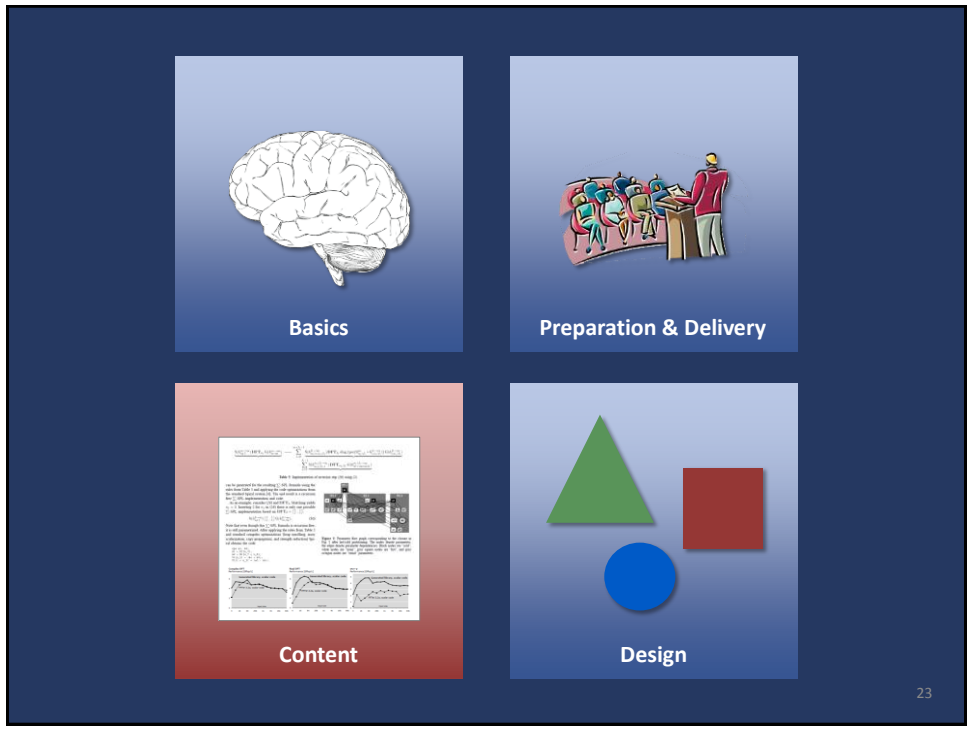
Nervousness

Top 10 fears

1. Fear of snakes
2. Fear of public speaking
3. Fear of heights
4. Fear of closed spaces
5. Fear of spiders (and insects)
6. Fear of needles
7. Fear of mice
8. Fear of flying
9. Fear of dogs
9. Fear of thunder
9. Fear of crowds

Source: U.S.A. Gallup Poll, February 18-21, 2001 (1,016 respondents)

- **Practice the presentation**
- **Be perfectly prepared**
  Train the beginning of the talk!
- **Take every small opportunity to present**



Note the transparency trick

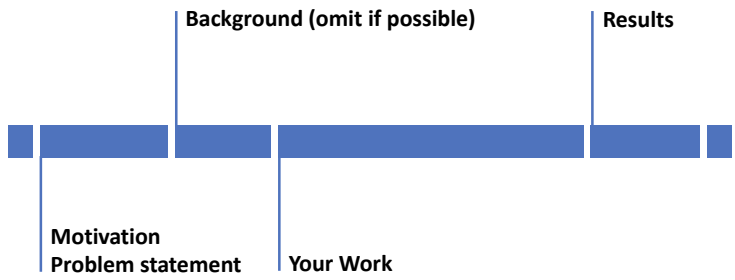
Be Clear About the Goal

~~***Goal 1:*** *In these 30 minutes explain the entire approach and technology including all relevant details*~~

Goal 2: *In these 30 minutes explain what main problem the technology addresses, one or two key ideas in the approach, and one or two key results. Get people excited to learn more.*

A presentation is a story
that starts on the first slide

Typical Organization



Not every slide needs a title

Motivation
Problem statement

- *What? Why? Why important?*
- **Exceptionally clear**
- **If possible, precise problem statement:**
  - Given …., we want to compute …
  - Input: …., Output: ….
  - Block diagram showing input/output
- **Start interesting**
  - example result
  - interesting fact plus source
  - anything that starts the story

The Problem

- **Computers architectures have become more complex**
  - Memory hierarchies
  - Vector extensions
  - Multiple cores
- **Optimizing for software for these features is very difficult**
  - Compilers f[illegible] to do it
  - Hence the [illegible]
  - Requires [illegible]
- **Performance does not port**
  - Needs re-optimization for every new processor
  - Without optimization: often 10x performance loss
- **Particularly noticeable for computing functions**
  - Matrix multiplication
  - Discrete Fourier transform
  - others

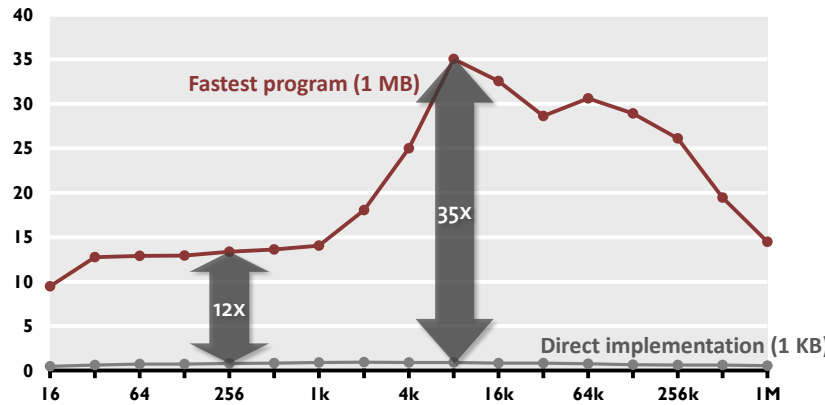
boring

Don’t start with a text-only bullet slide

Example first slide: good

The Problem: Example DFT

Discrete Fourier transform (single precision) on Intel Core i7 (4 cores)
Performance [Gflop/s]



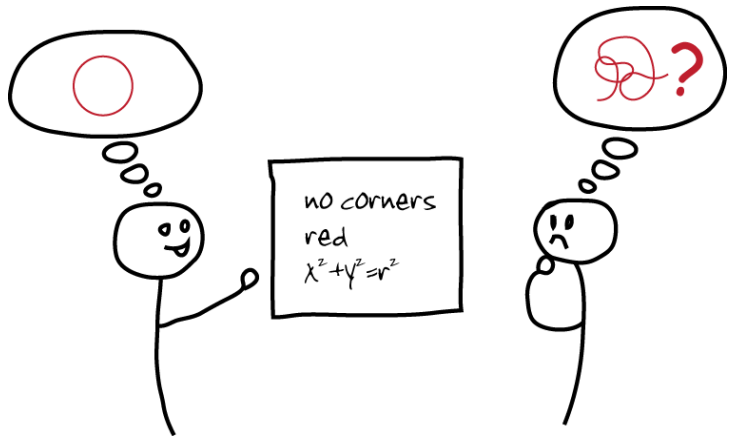
- **Same operations count**
- **Best compiler and flags**

- **Communicate main idea(s) and approach**
- **Do not (try to) communicate every detail of your work**
- ***How to explain technical work well?***

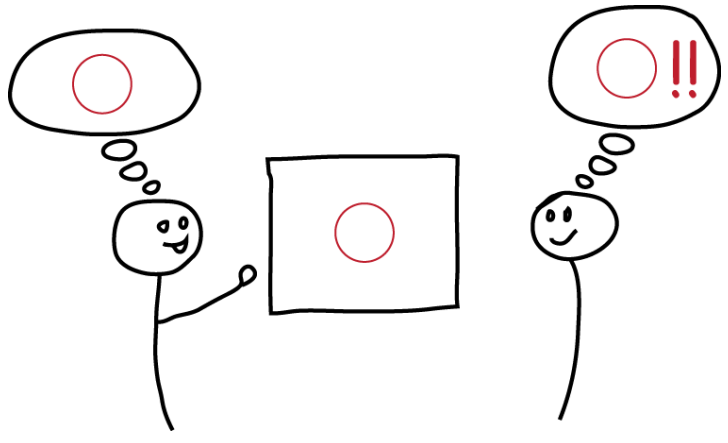
Explaining well

- *Visualize*
- *Use examples not generic explanations*
- *Small example, full truth*

Don’t just talk about it ….



… show it!



Example: not so good

Statistical Classification: C4.5

- **C4.5 generates decision trees from training data**
- **The trees can be used for classification**
- **Formally:**
  - Input: Training set of size m; each member has n features

Features *Classes*

Samples

$$\begin{pmatrix} x_{1,1} & x_{1,2} & \dots & x_{1,n} & c_1 \\ x_{2,1} & x_{2,2} & \dots & x_{2,n} & c_2 \\ \dots & \dots & \dots & \dots & \dots \\ x_{m,1} & x_{m,2} & \dots & x_{m,n} & c_m \end{pmatrix}$$

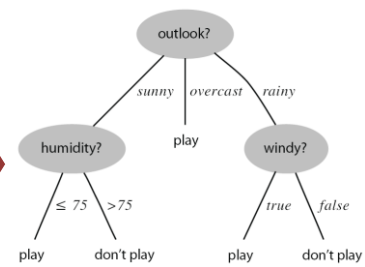
  - Output: decision trees mapping samples to classes

Example: good

Statistical Classification: C4.5

Outlook	Temperature	Humidity	Windy	Decision
sunny	85	85	false	don't play
sunny	80	90	true	don't play
overcast	83	78	false	play
rain	70	96	false	play
rain	68	80	false	play
rain	65	70	true	don't play
overcast	64	65	true	play
sunny	72	95	false	don't play
sunny	69	70	false	play
rain	75	80	false	play
sunny	75	70	true	play
overcast	72	90	true	play
overcast	81	75	false	play
rain	71	80	true	don't play

C4.5



P(play|windy=false) = 6/8
P(don't play|windy=false) = 2/8
P(play|windy=true) = 1/2
P(don't play|windy=false) = 1/2

H(windy=false) = 0.81

H(windy=true) = 1.0

Entropy of Features

H(windy) = 0.89

H(outlook) = 0.69
H(humidity) = …

Example: context for next slide

Linear Transforms

Output ***Input***

Example: $T = \mathbf{DFT}_n = [e^{-2k\ell\pi i/n}]_{0 \le k,\ell < n}$

Example: bad

Fast Fourier Transforms (FFTs)

- **Can be expressed as structured matrix factorizations**

$$\mathbf{DFT}_{mn} = (\mathbf{DFT}_m \otimes I_n) T^{mn}_m (I_m \otimes \mathbf{DFT}_n) L^{mn}_m$$

- **Formalism:**

L^{mn}_n	$in + j \mapsto jm + i, \quad 0 \le i < n,\ 0 \le j < m$
I_n	$n \times n$ identity matrix
$A \otimes B$	$[a_{k,\ell} B]_{0 \le k,\ell < n},\ A = [a_{k,\ell}]$
T^{mn}_m	a diagonal matrix

Example: good (small example)

Fast Fourier Transform: Size 4

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & i & -1 & -i \\ 1 & -1 & 1 & -1 \\ 1 & -i & -1 & i \end{bmatrix} x = \begin{bmatrix} 1 & \cdot & 1 & \cdot \\ \cdot & 1 & \cdot & 1 \\ 1 & \cdot & -1 & \cdot \\ \cdot & 1 & \cdot & -1 \end{bmatrix} \begin{bmatrix} 1 & \cdot & \cdot & \cdot \\ \cdot & 1 & \cdot & \cdot \\ \cdot & \cdot & 1 & \cdot \\ \cdot & \cdot & \cdot & i \end{bmatrix} \begin{bmatrix} 1 & 1 & \cdot & \cdot \\ 1 & -1 & \cdot & \cdot \\ \cdot & \cdot & 1 & 1 \\ \cdot & \cdot & 1 & -1 \end{bmatrix} \begin{bmatrix} 1 & \cdot & \cdot & \cdot \\ \cdot & \cdot & 1 & \cdot \\ \cdot & 1 & \cdot & \cdot \\ \cdot & \cdot & \cdot & 1 \end{bmatrix} x$$

12 adds, 4 mults *4 adds* *1 mult* *4 adds*

Matrix formalism:

$$\mathbf{DFT}_4 = (\mathbf{DFT}_2 \otimes I_2) T_2^4 (I_2 \otimes \mathbf{DFT}_2) L_2^4$$

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Example: good (then full truth)

Other Transform Algorithm

$$\begin{aligned}
\mathbf{DFT}_n &\to P_{k/2,2m}^{\top} \left(\mathbf{DFT}_{2m} \oplus \left(I_{k/2-1} \quad {}_i C_{2m}\, \mathbf{rDFT}_{2m}(i/k)\right)\right) \left(\mathbf{RDFT}'_k \quad I_m\right), \quad k \text{ even}, \\
\begin{vmatrix} \mathbf{RDFT}_n \\ \mathbf{RDFT}'_n \\ \mathbf{DHT}_n \\ \mathbf{DHT}'_n \end{vmatrix} &\to (P_{k/2,m}^{\top} \quad I_2) \left(\begin{vmatrix} \mathbf{RDFT}_{2m} \\ \mathbf{RDFT}'_{2m} \\ \mathbf{DHT}_{2m} \\ \mathbf{DHT}'_{2m} \end{vmatrix} \oplus \left(I_{k/2-1} \quad {}_i D_{2m} \begin{vmatrix} \mathbf{rDFT}_{2m}(i/k) \\ \mathbf{rDFT}_{2m}(i/k) \\ \mathbf{rDHT}_{2m}(i/k) \\ \mathbf{rDHT}_{2m}(i/k) \end{vmatrix} \right) \right) \left(\begin{vmatrix} \mathbf{RDFT}'_k \\ \mathbf{RDFT}'_k \\ \mathbf{DHT}'_k \\ \mathbf{DHT}'_k \end{vmatrix} \quad I_m \right), \quad k \text{ even}, \\
\begin{vmatrix} \mathbf{rDFT}_{2n}(u) \\ \mathbf{rDHT}_{2n}(u) \end{vmatrix} &\to L_m^{2n} \left(I_k \quad {}_i \begin{vmatrix} \mathbf{rDFT}_{2m}((i+u)/k) \\ \mathbf{rDHT}_{2m}((i+u)/k) \end{vmatrix} \right) \left(\begin{vmatrix} \mathbf{rDFT}_{2k}(u) \\ \mathbf{rDHT}_{2k}(u) \end{vmatrix} \quad I_m \right), \\
\mathbf{RDFT\text{-}3}_n &\to (Q_{k/2,m}^{\top} \quad I_2)\, (I_k \quad {}_i \mathbf{rDFT}_{2m})(i+1/2)/k))\, (\mathbf{RDFT\text{-}3}_k \quad I_m), \quad k \text{ even}, \\
\mathbf{DCT\text{-}2}_n &\to P_{k/2,2m}^{\top} \left(\mathbf{DCT\text{-}2}_{2m}\, K_2^{2m} \oplus \left(I_{k/2-1} \quad N_{2m}\, \mathbf{RDFT\text{-}3}_{2m}^{\top}\right)\right) B_n (L_{k/2}^{n/2} \quad I_2)(I_m \quad \mathbf{RDFT}'_k) Q_{m/2,k}, \\
\mathbf{DCT\text{-}3}_n &\to \mathbf{DCT\text{-}2}_n^{\top}, \\
\mathbf{DCT\text{-}4}_n &\to Q_{k/2,2m}^{\top} \left(I_{k/2} \quad N_{2m}\, \mathbf{RDFT\text{-}3}_{2m}^{\top}\right) B'_n (L_{k/2}^{n/2} \quad I_2)(I_m \quad \mathbf{RDFT\text{-}3}_k) Q_{m/2,k}. \\
\mathbf{DFT}_n &\to (\mathbf{DFT}_k \quad \mathsf{I}_m)\, \mathsf{T}_m^n (\mathsf{I}_k \quad \mathbf{DFT}_m)\, \mathsf{L}_k^n, \quad n = km \\
\mathbf{DFT}_n &\to P_n (\mathbf{DFT}_k \quad \mathbf{DFT}_m) Q_n, \quad n = km,\ \gcd(k,m) = 1 \\
\mathbf{DFT}_p &\to R_p^T (\mathrm{I}_1 \oplus \mathbf{DFT}_{p-1}) D_p (\mathrm{I}_1 \oplus \mathbf{DFT}_{p-1}) R_p, \quad p \text{ prime} \\
\mathbf{DCT\text{-}3}_n &\to (\mathsf{I}_m \oplus \mathsf{J}_m)\, \mathsf{L}_m^n (\mathbf{DCT\text{-}3}_m(1/4) \oplus \mathbf{DCT\text{-}3}_m(3/4)) \\
&\qquad \cdot (\mathsf{F}_2 \quad \mathsf{I}_m) \begin{bmatrix} \mathsf{I}_m & 0 \oplus -\mathsf{J}_{m-1} \\ & \frac{1}{\sqrt{2}}(\mathsf{I}_1 \oplus 2\mathsf{I}_m) \end{bmatrix}, \quad n = 2m \\
\mathbf{DCT\text{-}4}_n &\to S_n \mathbf{DCT\text{-}2}_n\, \mathrm{diag}_{0 \le k < n}(1/(2\cos((2k+1)\pi/4n))) \\
\mathbf{IMDCT}_{2m} &\to (\mathsf{J}_m \oplus \mathsf{I}_m \oplus \mathsf{I}_m \oplus \mathsf{J}_m) \left(\left(\begin{bmatrix} 1 \\ -1 \end{bmatrix} \quad \mathsf{I}_m \right) \oplus \left(\begin{bmatrix} -1 \\ -1 \end{bmatrix} \quad \mathsf{I}_m \right) \right) \mathsf{J}_{2m}\, \mathbf{DCT\text{-}4}_{2m} \\
\mathbf{WHT}_{2^k} &\to \prod_{i=1}^{t} (\mathsf{I}_{2^{k_1+\cdots+k_{i-1}}} \quad \mathbf{WHT}_{2^{k_i}} \quad \mathsf{I}_{2^{k_{i+1}+\cdots+k_t}}), \quad k = k_1 + \cdots + k_t \\
\mathbf{DFT}_2 &\to \mathsf{F}_2 \\
\mathbf{DCT\text{-}2}_2 &\to \mathrm{diag}(1, 1/\sqrt{2})\, \mathsf{F}_2 \\
\mathbf{DCT\text{-}4}_2 &\to \mathsf{J}_2 \mathsf{R}_{13\pi/8}
\end{aligned}$$

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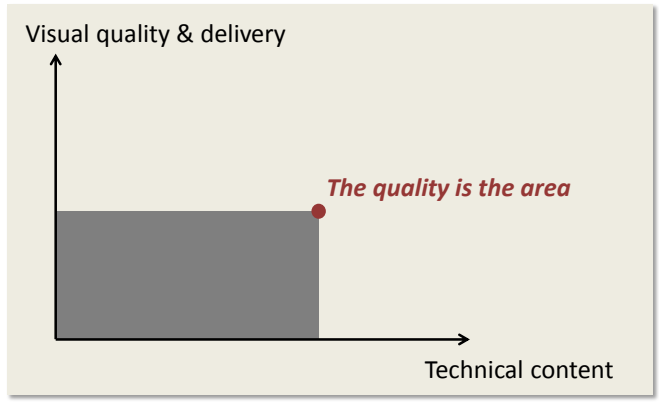
- Precise experimental setup
- More later on data

Most Common Mistakes

- Thinking: If one can understand it well, people will think it's trivial
- Too many slides
- Slides too packed

The Design (The Looks)



Design is about efficient communication, not about making things pretty

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

SPIRAL
www.spiral.net

~~*Start by creating a nice Master layout with logos and additional information*~~

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Swiss Federal Institute of Technology Zurich

SPIRAL
www.spiral.net

Do Not

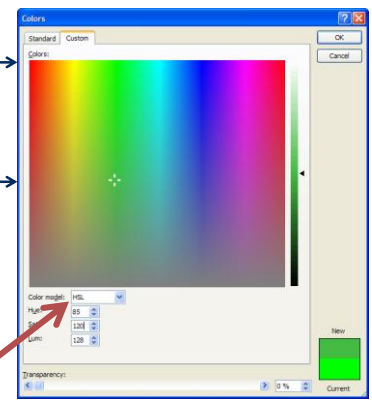
- Decorate
- Clutter with logos
- Put name, date, conference name, etc.

- Slide numbers are useful
- You can add copyright/info when you give slides away

Colors: Basics

Avoid fully saturated

Choose somewhat desaturated



Hue
Saturation
Luminosity (brightness)

HSL

Warm Colors Dominate, Cool Colors Recede

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

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

- But also dark colors (again, desaturated) can be useful

Design principles

- *Alignment*
- *Layering*

Alignment

- **Everything is aligned to something else**
- **If in doubt align *left***

Example alignment: good

Nervousness

Top 10 fears

1. Fear of snakes
2. Fear of public speaking
3. Fear of heights
4. Fear of closed spaces
5. Fear of spiders (and insects)
6. Fear of needles
7. Fear of mice
8. Fear of flying
9. Fear of dogs
9. Fear of thunder
9. Fear of crowds

Source: U.S.A. Gallup Poll, February 18-21, 2001 (1,016 respondents)

- **Practice the presentation**
- **Be perfectly prepared**
- **Take every small opportunity to present**
- **If it's really bad**
  - Try some tricks from books
  - See a specialist

Layering

Hierarchical organization of elements through proper use of contrast, emphasis, and de-emphasis

Example good

Nervousness

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Layering

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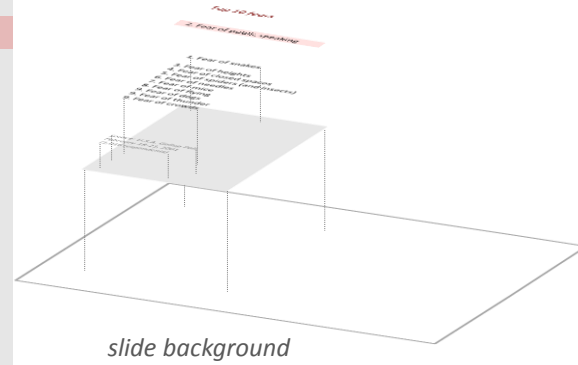
Source: U.S.A. Gallup Poll, February 18-21, 2001 (1,016 respondents)



slide background

Example bad

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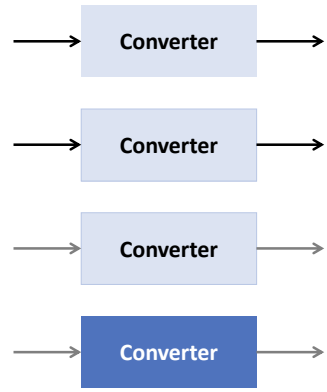
Boxes

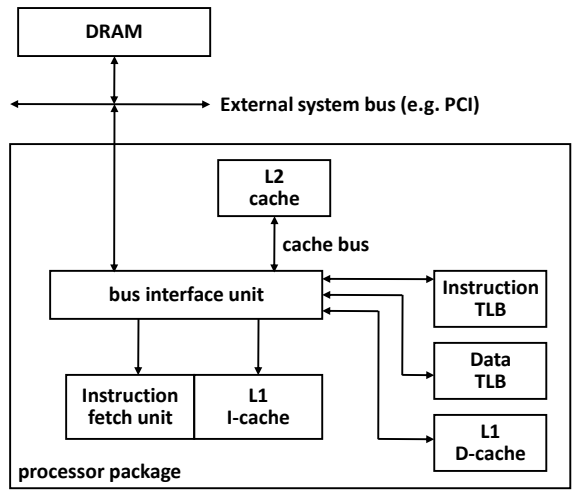


Bad:
- Arrow does not touch
- Arrow not aligned
- Text in box not aligned
- ***Frame activates negative space!***
  → ***Visual noise***

Good (from the top):
- Box filled (layering) , no frame
- Thin frame in slightly darker color (better contrast to background)
- ***Best:*** Arrows de-emphasized (layering)
- ***Best:*** Box inverted (contrast)

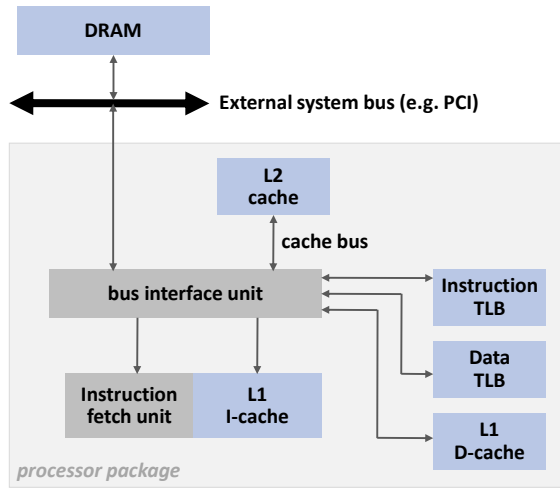
Example bad

P6 Memory System



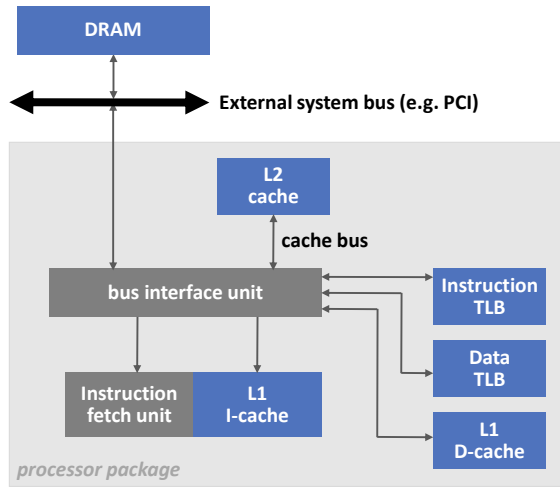
Example good

P6 Memory System



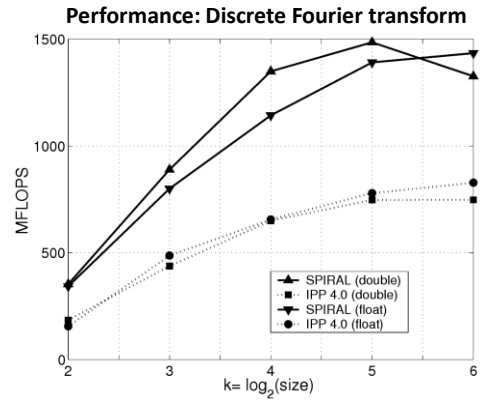
Example good

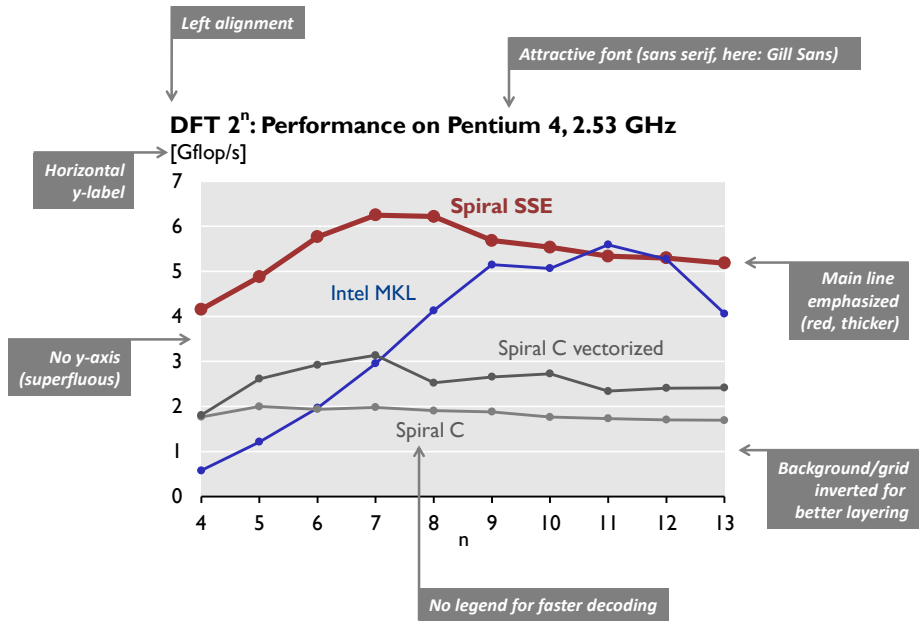
P6 Memory System



Presenting 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 bad…***

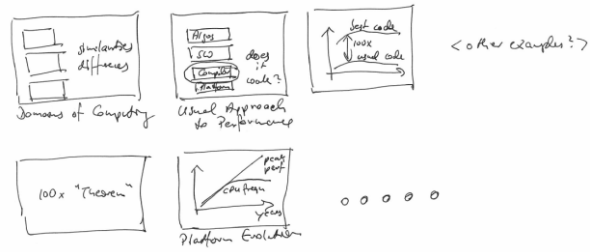




Final words

Creating a Presentation

- **Who is the audience, what do they know/think?**
- **What do you want to achieve?**
- **Come up with the storyline**
- **Think about good visuals (diagrams, graphs, fotos, screenshots) to support the story; then sketch the presentation on paper**



How to Get Better

- **Study the principles and apply them**
- **Give your best in every presentation**
- **Learn to verbalize the reason for design decisions and for problems with a slide**
  - Explain and help others
  - Evaluate presentations you see
- **Reduce text more and more**
- **Think hard about visualizations and good examples**
- **Experiment**
- **Expand your knowledge**
  - Books (next slide)
  - Watch great presentations online (e.g., TED talks)

Some Books This Lecture Draws From

- 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

Last Tip:
Never end with a

Thank you!

slide