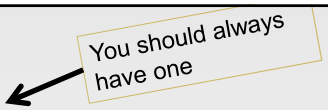
Physics 496
Introduction to Research

Lecture 5.0: Effective Scientific Presentations

Lance Cooper, Celia Elliot, Dave Hertzog, Al Nathan, Tony Liss, Doug Beck

This is an outline



- Different types of presentations
  - Know your audience and your goal
- Organizing your talk
- Conveying information
  - Using figures, tables and equations
- Powerpoint aesthetics
- Practicing your talk
  - Don't under practice
  - Don't over practice
- Delivering your talk

From yeV to TeV: Search for the Neutron Electric Dipole Moment

DHB/Illinois
Feb. 2013

Outline

1. Why an EDM?
2. The first measurement
3. The EDM landscape
4. nEDM at FRM II reactor (Munich)
5. nEDM at SNS (Oak Ridge)
6. Physics beyond the standard model

1. Why an EDM?
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Why are presentations necessary?

Publications lag months/years behind results

Talks at scientific meetings are current!!

Talks at scientific meetings allow interaction with your scientific community.

Presentations can accentuate results/ideas

Talks before your research group, collaboration meetings.

Your future job will require presentations

You will give talks as a job candidate.

You will give presentations as an employee.

You will give presentations as an instructor.

You will give presentations to the funding agencies.

Answer 4 strategic questions

What is your goal in giving this talk?

Who's your audience?

How much time do you have?

What key points do you want the audience to take away?

What is your goal?

Persuade collaborators your analysis is correct

Disseminate your results

Teach the audience something

Learn something from the audience

Gain the respect of the community

Establish future collaborations

Get a job or secure funding

Learn something yourself—gain a new perspective on your work

Who is the audience?

- Don't over-estimate what the audience knows.
  - Audiences rarely mind being told things they already know.
  - Avoid assuming they know something they don't.

- How large is the audience?
- What two or three key points from your talk should they take home?
- What background information do they need so that they can understand these points?

Don't run over!

Know how much time you have and STICK TO IT.
This requires experience *and practice.*

What are the key points?

Write down the 2–3 key ideas you wish to convey!

The introductory material flows from these ideas (what background/motivation does the audience need?)

The body of the presentation flows from these ideas (what supporting evidence, figures, and data do you need to present?)

How do I start writing the talk?

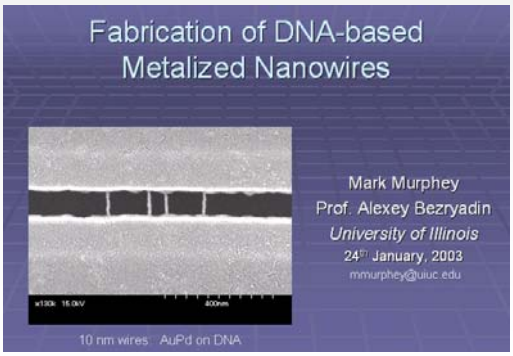
- Start with the 2-3 key points, then
  - Motivate the key issues (Introduction)
  - Preview your main messages
    tell them what you're going to tell them
  - Provide support for your messages (Body)
    tell them
  - Summarize your messages (Conclusion)
    tell them what you told them

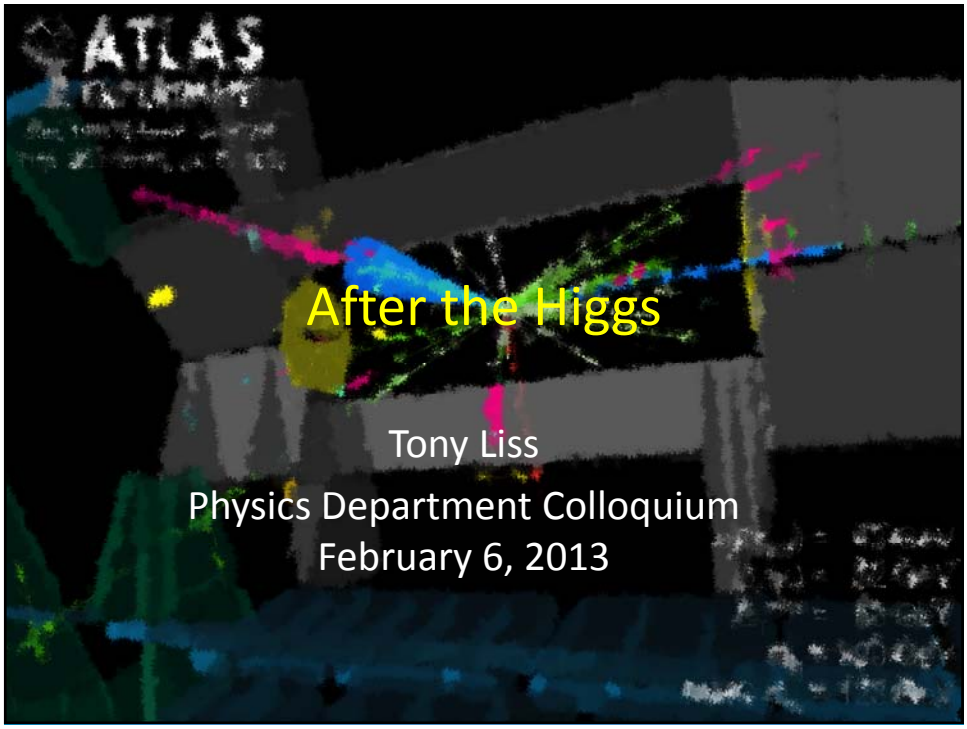
Organizing your talk

The title slide and outline prepares the audience to listen and tells them what to look for

Title slide

Your name and affiliation
Venue and date
Attention-getting graphic





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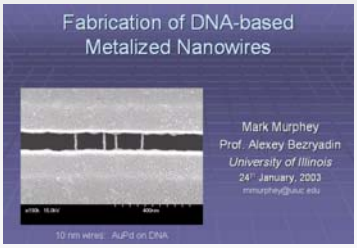

Outline or overview of presentation

- Prepares the audience to listen
- Provides a logical structure for your talk
- Provides motivation and context
- Summarizes key points (limit to three or four for a 20-minute talk)

Particle Physicists Ask …

1. **Why matter?**
   - CP Violation

2. **Why mass?**
   - Higgs field

3. **Why this standard model?**
   - SUSY or other extensions

Great overview slide, especially for a colloquim

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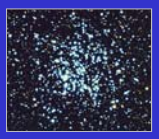
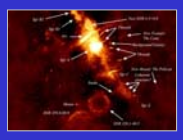
Overview

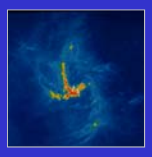
Black holes and star clusters





The galactic center

Intermediate-mass black hole kinematics



Here, we have a VISUAL and WRITTEN outline and it's not too long !

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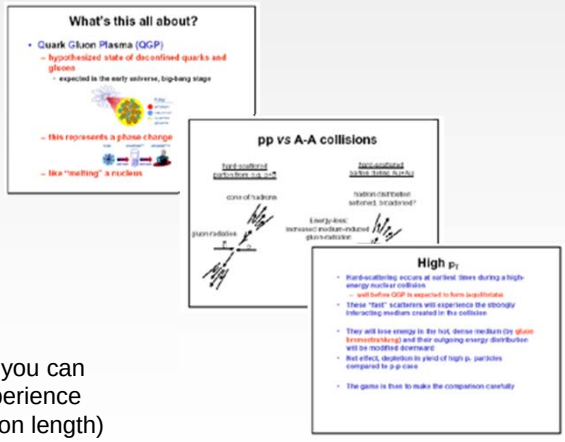
The body of your presentation is the intellectual content of your talk.

Problem statement, motivation
1–2 slides
Previous work
1 slide
Method
1–2 slides
Results
4–6 slides
Future work
1–2 slides



slides are guidelines only, you can and will adapt them with experience (and scale them depending on length)

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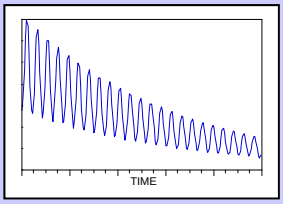
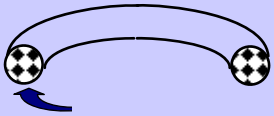
Superb slide! This explains in pictures and very few words the essence of the experiment. Note the schematic equation.

We measure

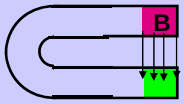
(1) Precession frequency



(2) Muon distribution



(3) Magnetic field map



$$(g-2) \propto \frac{(1)}{\langle \int (2)(3) \rangle}$$

Double Blind Analysis

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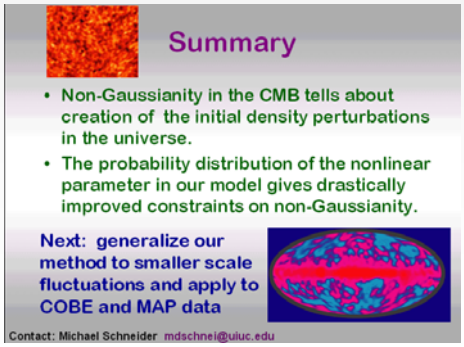
Provide a summary slide

Recap key results
Reiterate principal conclusions
Repeat your contact information



This slide will probably stay on the screen during the question period and will thus get the longest audience exposure—make it count!

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Summary & Conclusions

Not "exciting" but it has the pieces

- All g-2 data published
  - Systematics lowered again

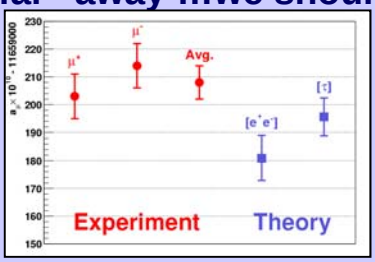
What we did

- Consistent results, consistently above theory
  - ee – tau controversy sill quite active
  - considerably more "ee" type data on the way

Where we stand: summarized nicely on the plot

- The systematic limit is "far" away …we should go there

What to do next



Note e-mail and web link.

hertzog@uiuc.edu Copy of talk: www.npl.uiuc.edu/~hertzog/ASPENg2.pdf

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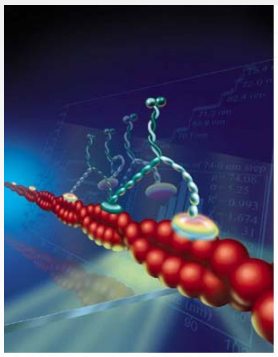
Use figures to illustrate your key points

(and make your slides easier to look at)



Myosin “walking” on actin
Courtesy of P. Selvin

They enliven slides, promote audience interest, provide supporting evidence for key points, and help explain complex ideas and relationships quickly, show how things work, etc.

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Remember what we said about figures?

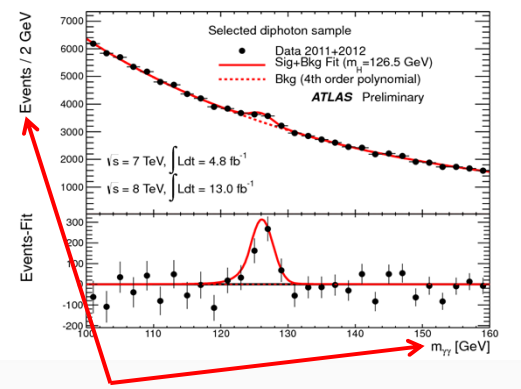
Point out important features

Provide a brief caption

Give credit if it’s not yours.

Words on the slide should relate to information in the figure.

Not too much on one slide.

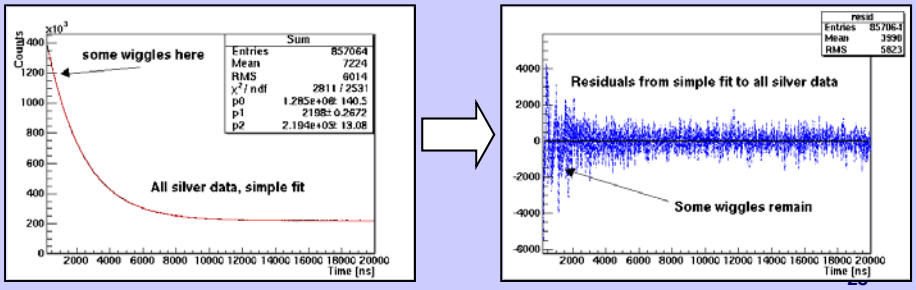


Labels & Units!

Invariant mass spectrum in 17.8 fb^{-1} of ATLAS data showing the “Higgs” mass peak.

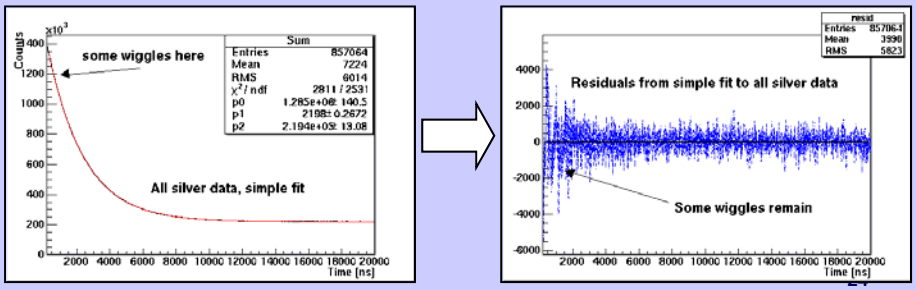
Presenting data is your most important and challenging task

- Avoid copying a graph for a formal article – they have a different style
- Use color and make lines thick
- Label axes and annotate important points with arrows and add words
- Use tables sparingly – if you do, highlight



Presenting data is your most important and challenging task

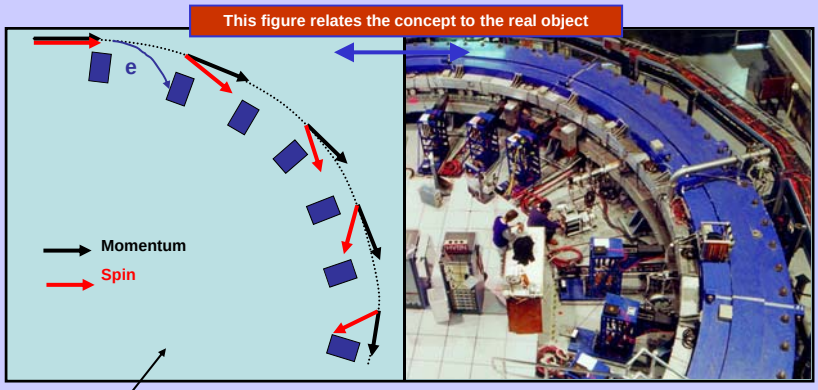
- What you show depends strongly on the audience
  - General audience: perhaps only left plot
  - Experts need to see the right plot too



The title is the conclusion of this slide

a_μ is proportional to the difference between the spin precession and the rotation rate

This figure relates the concept to the real object



$$\Delta\omega = \omega_a = \left(\frac{g-2}{2}\right)\frac{eB}{mc}$$

This supports assertion in sentence headline

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Fit to Simple 5-Par Function

This slide follows from the previous one, telling a story.

Equation uses COLOR to highlight the terms important to the talk

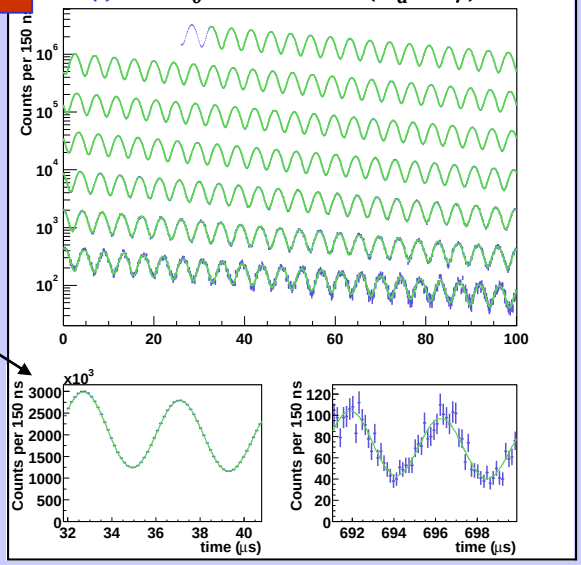
$$N(t) = N_0\, e^{-t/\tau}\,[1+A\cos(\omega_a t + \phi)]$$

Few billion events

Getting a good χ^2 is a challenge

For a talk meant for experts, additional slides will follow…

Blowups provide extra detail



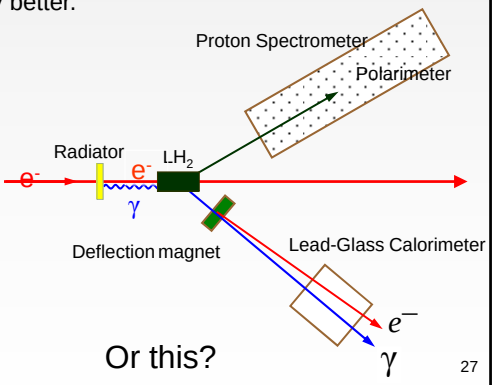
Experimentalists, show thy detector?

Only if

a) It's really awesome.
b) It really helps tell the story

Otherwise a schematic is probably better.

This?



Or this?

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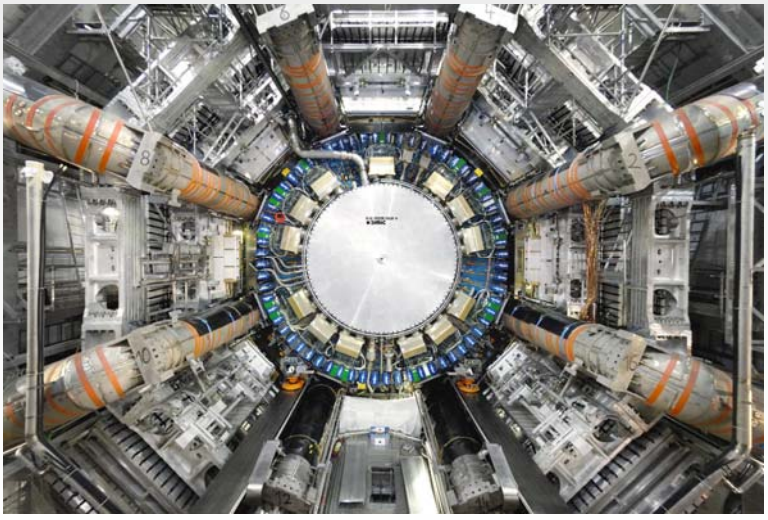
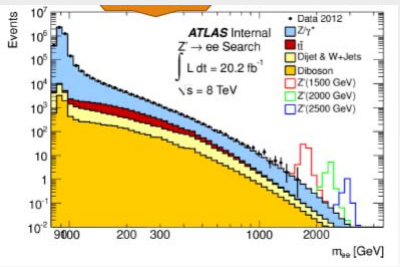
But if it's awesome…



Use graphs and tables to present numerical data

But not too dense!



This table is too dense for a talk

The important information is just this

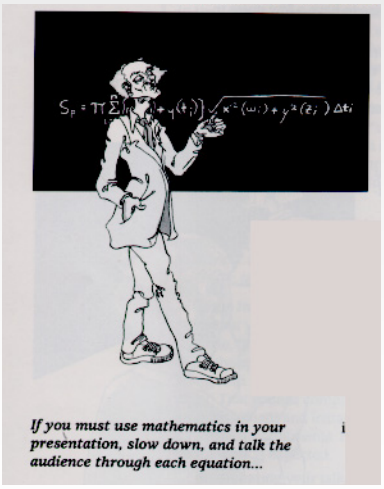
m_{ee} [GeV]	110 - 200	200 - 400	400 - 800	800 - 1200	1200 - 3000	3000 - 4500
Z / gamma	119000 ± 8000	13700 ± 900	1290 ± 90	68 ± 6	9.8 ± 1.1	0.008 ± 0.004
tt	7000 ± 800	2400 ± 400	160 ± 60	2.5 ± 0.6	0.117 ± 0.034	0.0000171 ± 0.0000100
Diboson	1830 ± 210	660 ± 160	93 ± 33	4.8 ± 0.8	0.79 ± 0.26	0.005 ± 0.004
Dijet, W+jet	3900 ± 800	1260 ± 310	230 ± 110	8.6 ± 2.4	0.9 ± 0.6	0.004 ± 0.006
Total	131000 ± 8000	18000 ± 1100	1780 ± 160	84 ± 6	11.6 ± 1.3	0.017 ± 0.009
Data	133131	18570	1827	98	10	0

Use a table to show what's not obvious from a figure
Keep them simple (this one is ~~borderline~~ too complicated)
Label and provide a caption (neither of which appear here!)

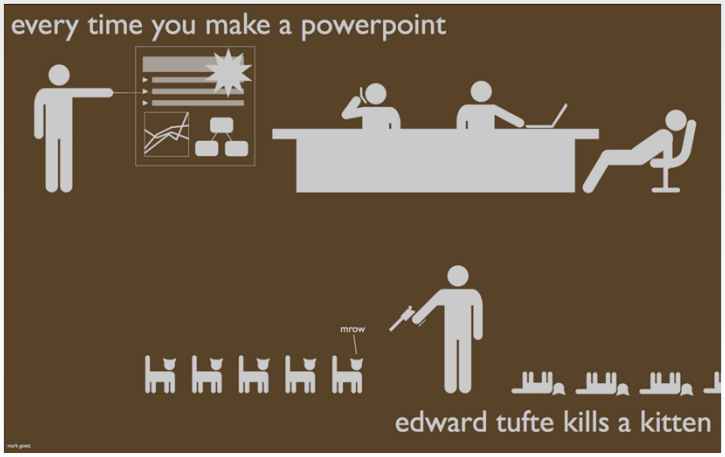
Use equations sparingly

Use equations only if absolutely necessary

If you use equations
- Slow down
- Talk through step by step
- Explain relevance
- Combine with a picture that illustrates the physical principle involved

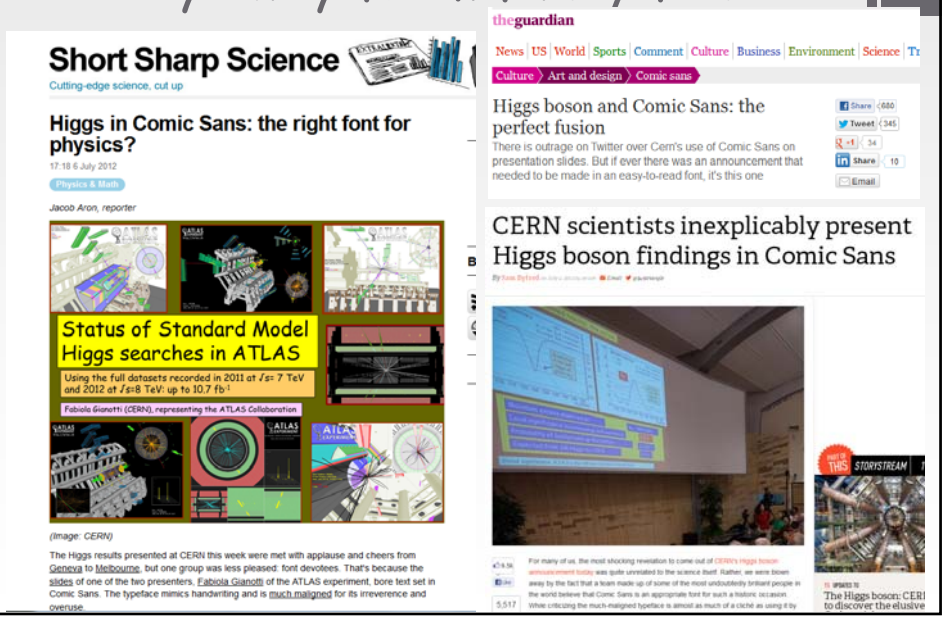


Use powerpoint with care



http://markandrewgoetz.com/blog/wp-content/uploads/2009/11/tufte-wallpaper.png

Stay away from funky fonts



Choose an easy-to-read font (36 pt)

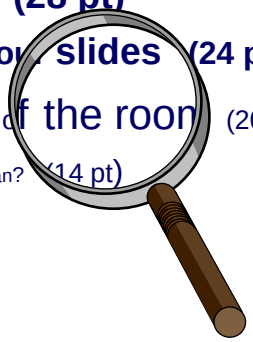
Make sure your audience (32 pt)

Can easily read (28 pt)

Every one of your slides (24 pt)

From the back of the room (20 pt)

See what I mean? (14 pt)



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Practice your talk

- Practice your talk so you know how long it is
- Think about how to segue from one slide to the next & remember where your story is going!
- Practice enough that your delivery is smooth, but not so much that it sounds scripted.
- Make sure you can fit in the allotted time! If not, rework it.
  - A little under the allotted time is OK. Way under is not.

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Deliver your talk

- Confidence
- Posture
- Eye contact
- Answer questions respectfully and if you don't know the answer, say so.
- Have fun!
  - If you don't have fun, it's unlikely the audience will

Don't forget the conclusions slide

- Know your audience and your goal
- Organize your talk around 2-3 key points
- Use figures and tables carefully to convey key information
- Practice enough, but not too much
- Connect with your audience and have fun delivering your talk