Principles of great scientific talks

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With slides from Maya Schuldiner, Susan McConnell, Robert Full, and ideas from many other students and colleagues

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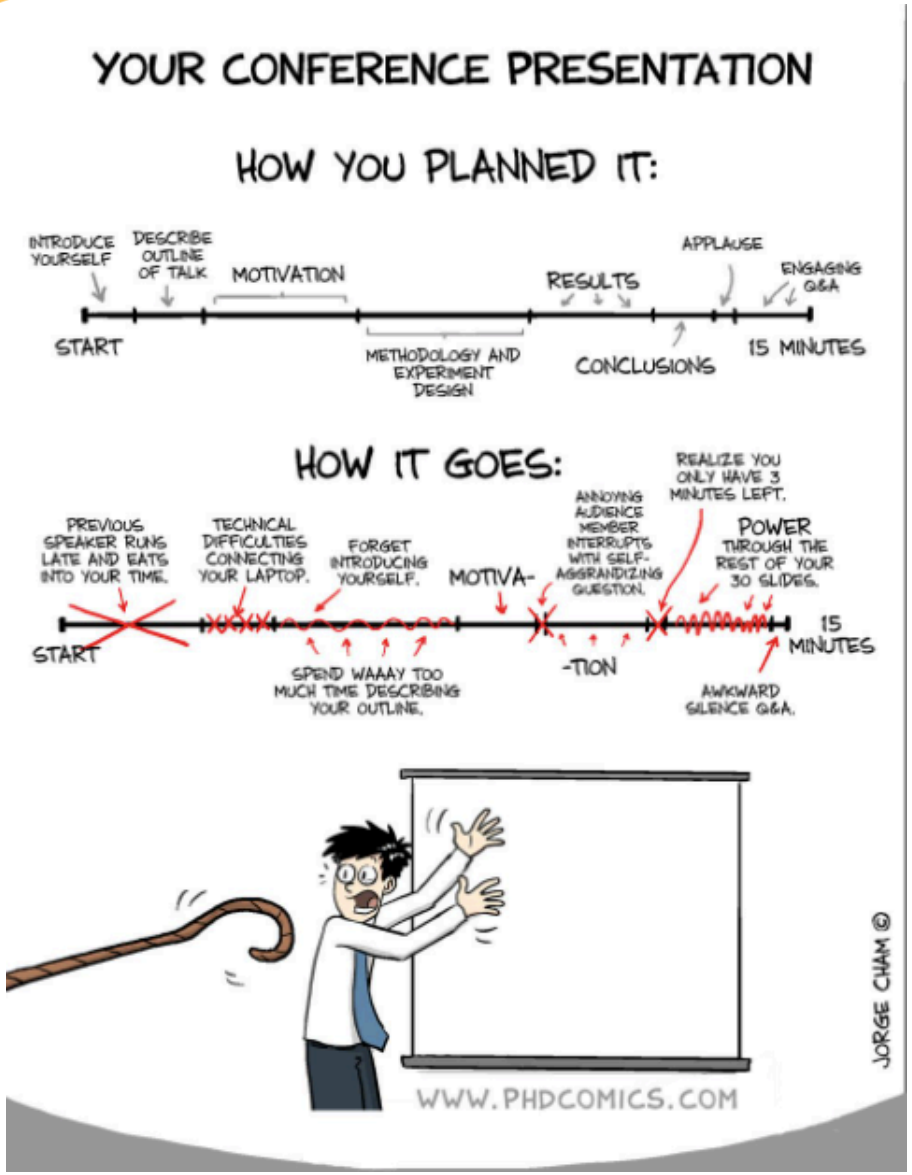
Berkeley Department of Integrative Biology



GOAL

Get people excited about your science!

NOT the goal…

- Detail every experiment you did to reach your conclusions
- Bombard audience with evidence to REALLY convince them
- Impress people that:
  - You are efficient
  - You have tons of data
  - You work in a cool field

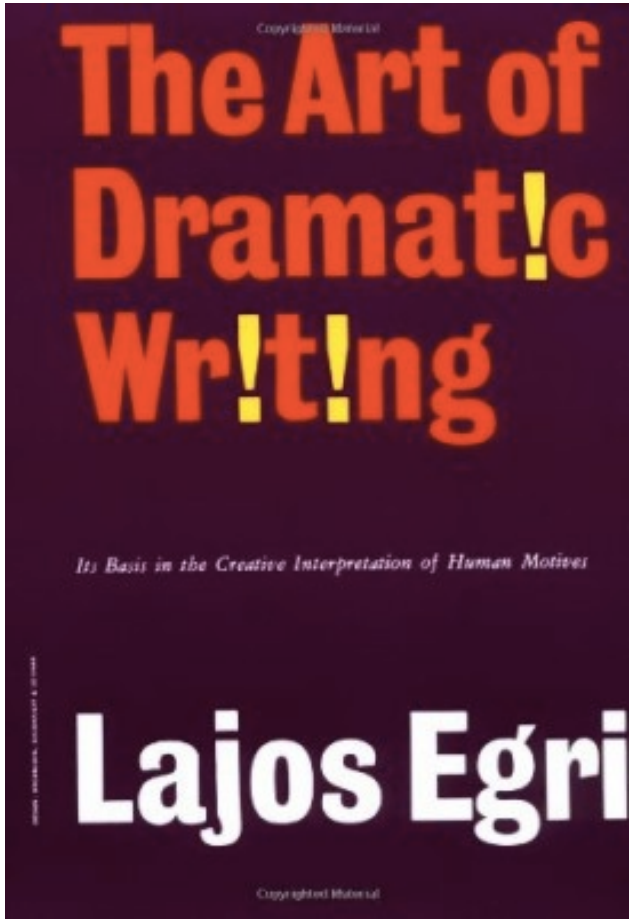
Brainstorming session: What makes a talk great?

Think of some of the great talks you have seen. What stood out about them? What made them stick in your mind?

What makes a talk great?

Content	Expertise
Conveys new information Poses an interesting question Discusses a novel discovery Makes you think about something differently	Credible Acknowledges people in the field Inspires trust and confidence Broad skill set Mastery of subject area
Clarity and organization	**Style and Delivery**
Well organized Clear storyline Understandable (no jargon) Uses clear and simple visual aids Doesn't run over time	Conveys enthusiasm Uses voice and body to be interesting Friendly and approachable Answers questions clearly

Key principle



- Each drama (talk) should have just one premise, and all information in the drama (talk) should only be there if it supports this premise
- A great presentation tells the audience a clear and compelling (dramatic!) STORY

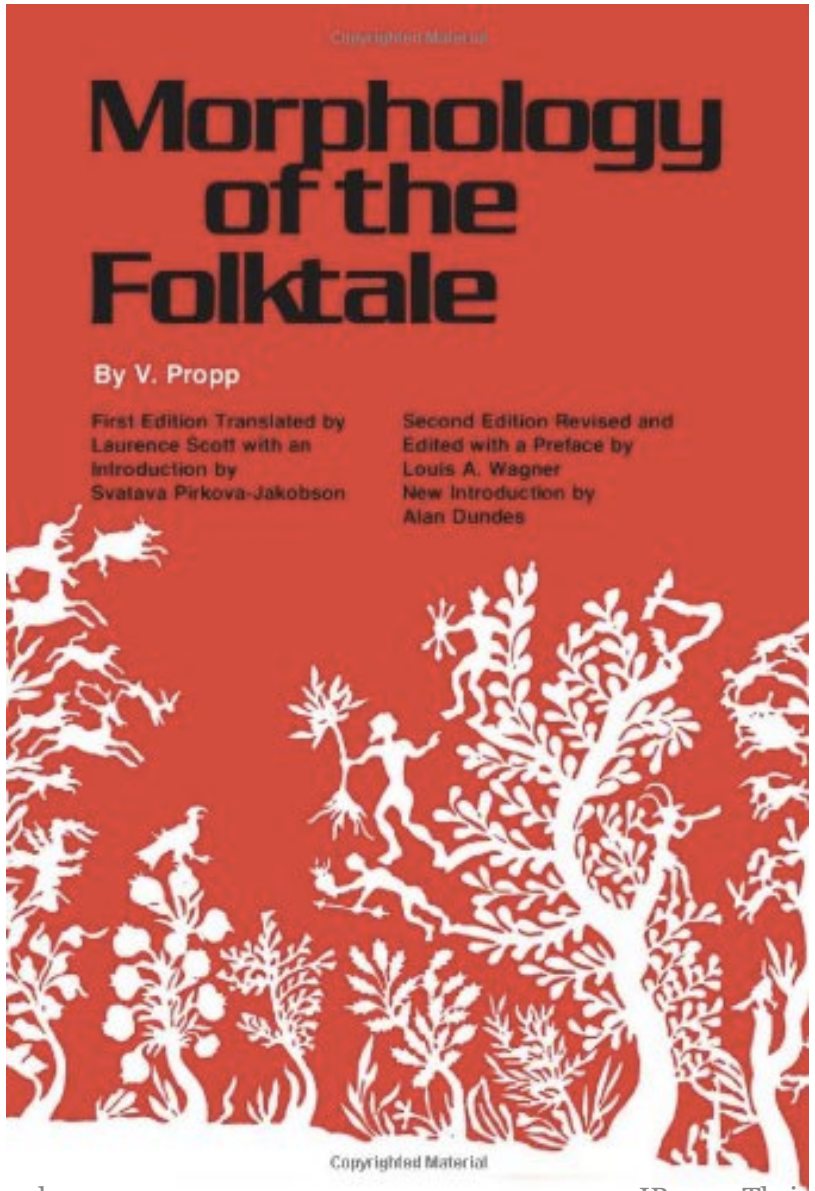
The 1:1:1 rule

- Each presentation should convey one take home message (it can be two projects if they underlie one message)
- Each slide should convey one message (Which can be written out as a whole sentence in the title)
- Each slide should contain one piece of data (it can be two panels if they complement each other to make one point)

If a piece of data does not support the title than drop it. If a slide does not support the main take home message of the talk drop it.

Know your audience

- Background and level of expertise? Mixed groups require depth within breadth. Use analogies and summarize for non-experts.
- Focus of program and other talks? Where will you be in the line-up?



A good talk is like a good story…

A good talk is like a good story…

- The hero has a miraculous birth
- There is a problem
- The hero decides to solve the problem
- There is a meeting with a magical creature/ Given magical help
- The hero thinks she solved the problem
- There is a twist in the plot – maybe the problem is not solved after all?
- Hero solves the second problem
- Happy end.

A good talk is like a good story…

- Our field had a magical birth (new field)
- There is a problem
- We set out to address it
- Magic ☺ developing a technology or tool – there was a challenge, we overcame it.
- With this tool we now fought/addressed the problem and won - we return to our field with new knowledge
- BUT, there is a caveat (limitation of the study)
- Caveat is addressed
- Happy end - implications are suggested.

Start with your STORY

- Write a short essay or list of bullet points that tell the essential elements of your story
  - “Hook”, Background and context, overarching question/hypotheses, experimental design, key results, answer to overarching question, broader conclusions, future directions
- Tell someone this story (ask them for feedback)
- Revise story (repeat as necessary)

Now, let's practice it…

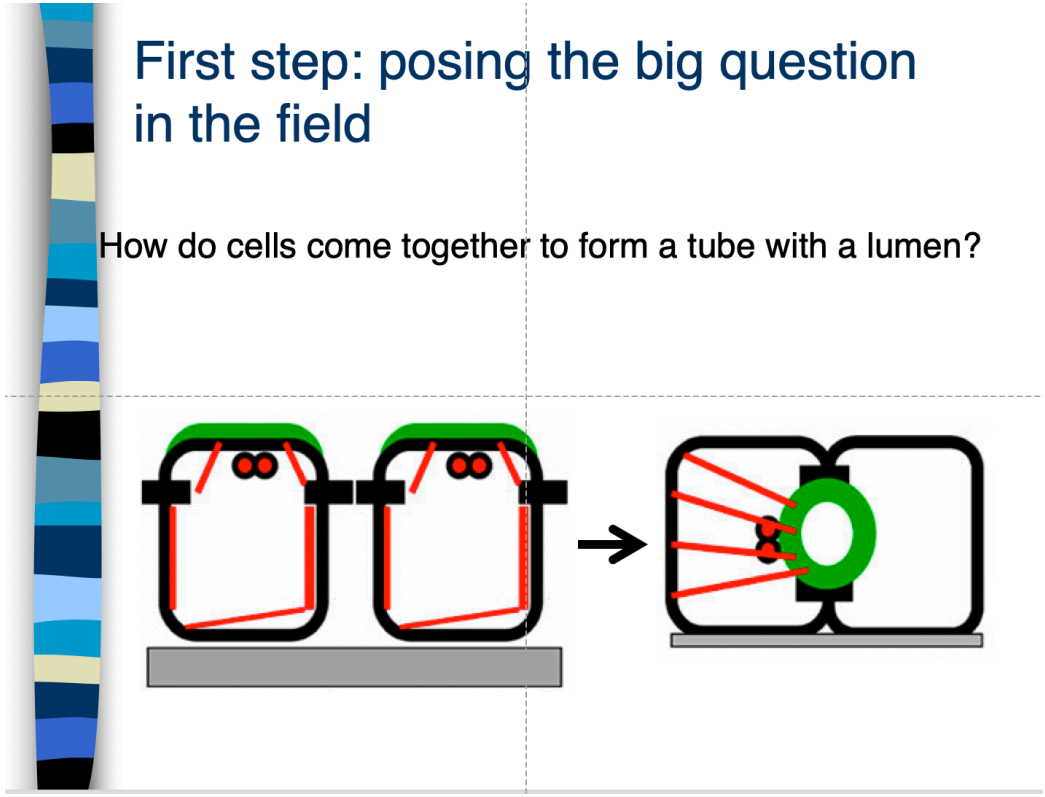
- Write out your own story, for a 5 minute "lightning" presentation
- Start with the premise (can be the title, or single sentence take-home message)
- Volunteers will share with group
- How do you feel about your research as a story?

Once you have a good story…

- Layout the structure of your talk
  - Each slide has a title that constitutes a sentence
  - The sentence conveys the major point of the slide
  - If you read the titles one after the other, you should get the storyline of your talk
- Key elements: “hook”, outline?, home slide (evolving working model that you return to and build throughout the talk), background (other people’s work too!), overarching question/hypotheses, experimental design, results, conclusions/implications, acknowledgements

Example “home slide”

Maya Schuldiner, Weizmann Institute of Sciences, Israel



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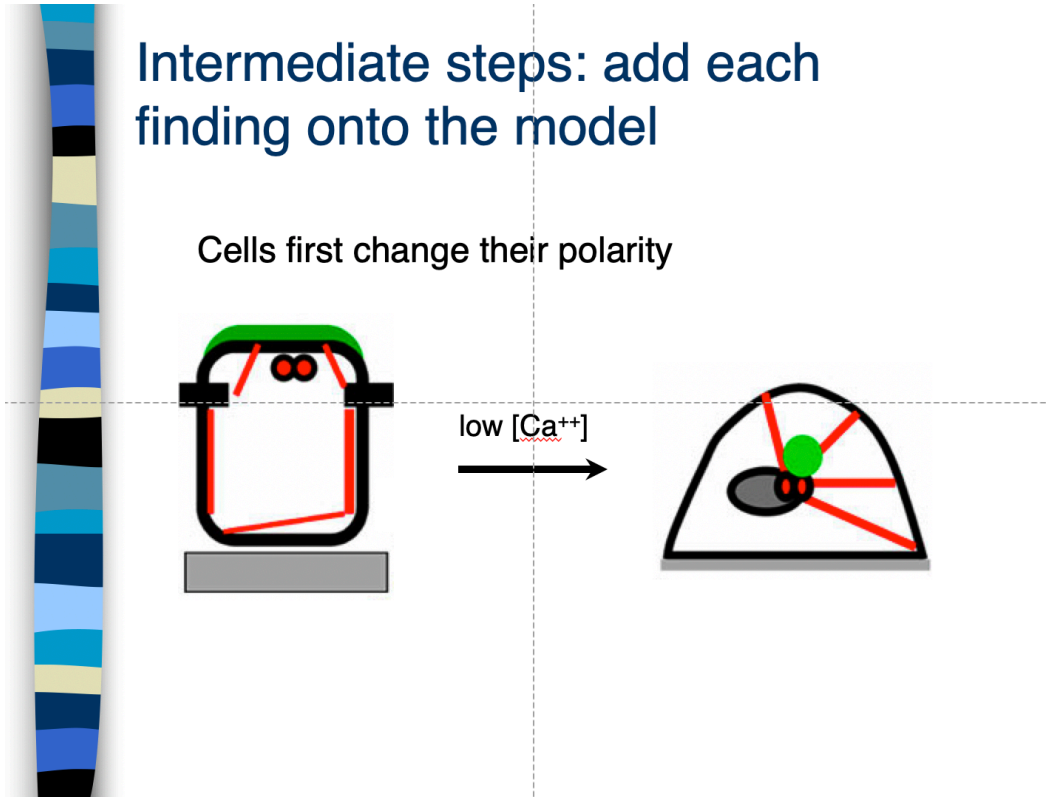

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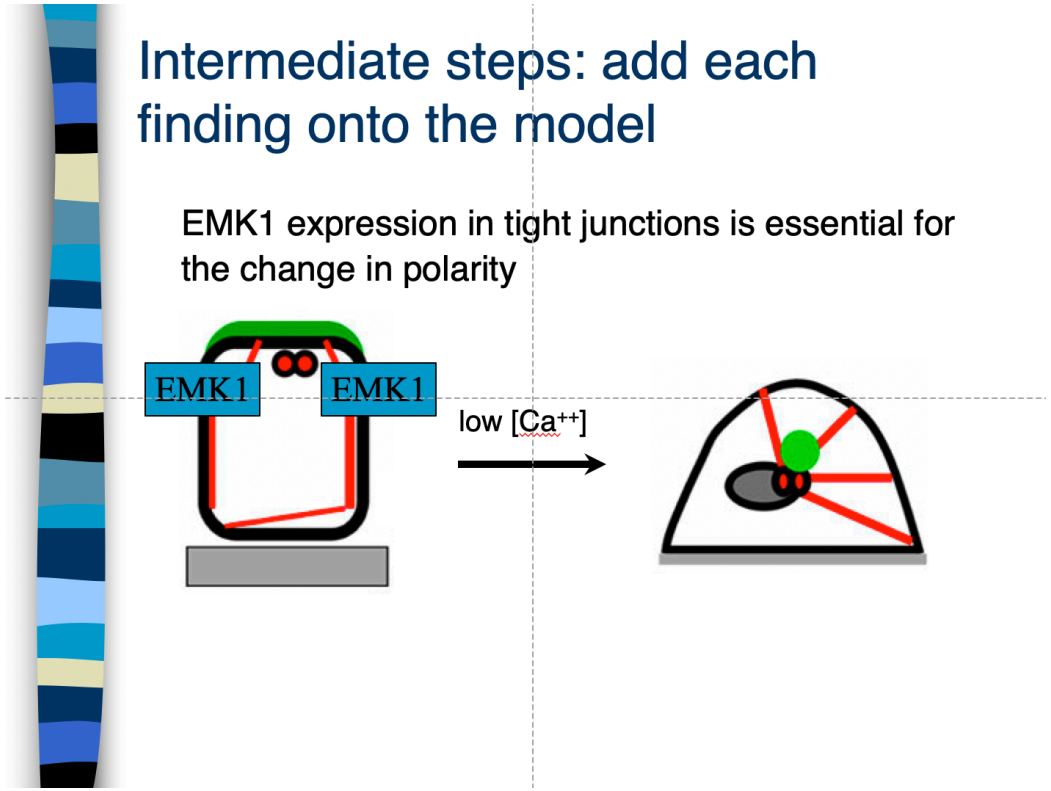

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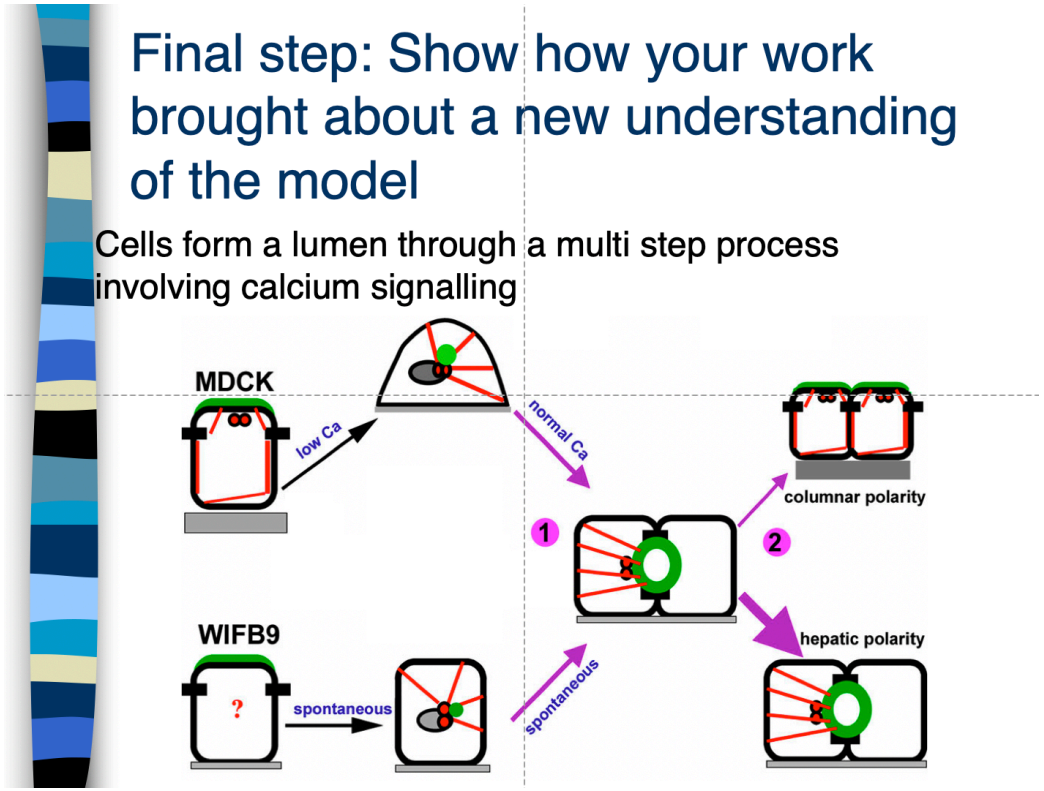

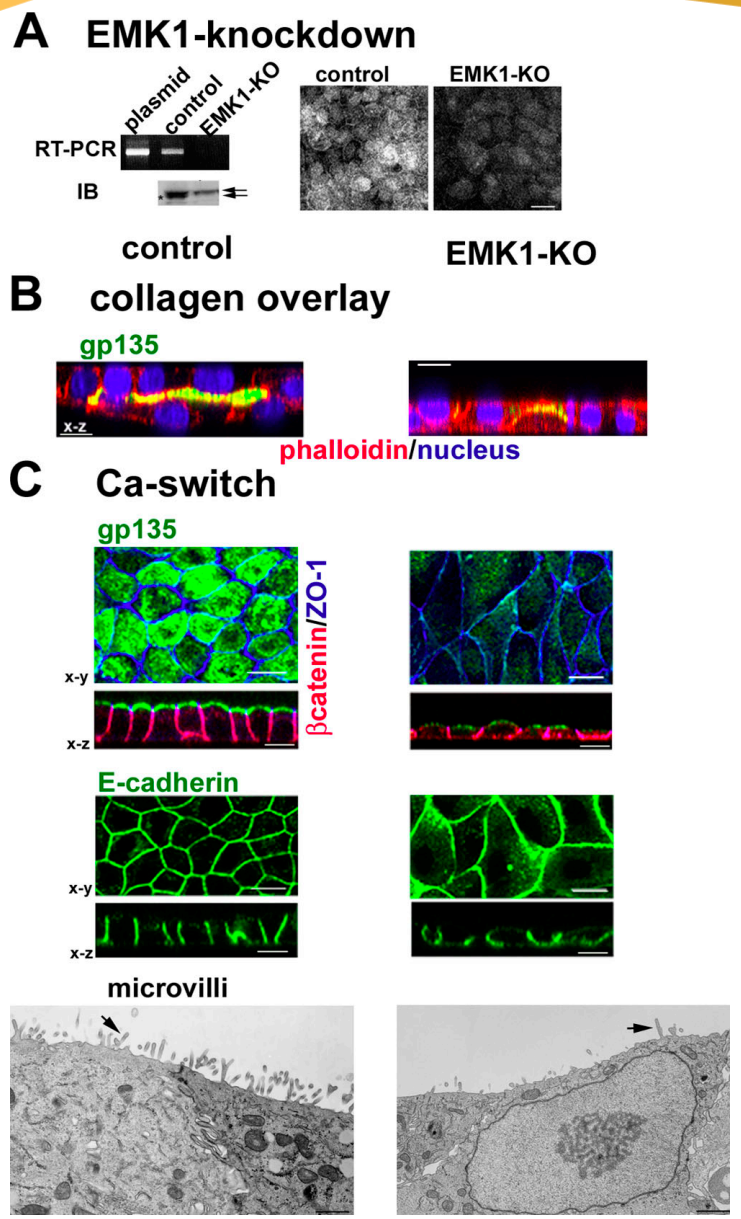

Emk1 knockdown inhibits lumen formation in MDCK cells:

-RT-PCR: EMK1 is effectively knocked down in MDCK cells 24 hours after transfection with P-SUPER (control) or P-SUPER-siEMK1 plasmid; knockdown confirmed on the right with antibodies to EMK1.

- Collagen overlay assay: cells cultured 24 h on collagen I before being overlaid with additional collagen on the apical surface, analyzed 24 h later. Note the lack of lumen in EMK1-KO cultures.

- Ca switch: control or EMK1-KO cells were plated in low Ca medium 24 h upon transfection with pSUPER or pSUPER-KO. After 12 h, cultures were switched to normal medium for 24 h. Transmission EM of cells sectioned perpendicular to the substratum shows lack of microvilli in EMK1-KO cells.

What do you think is wrong with this slide?

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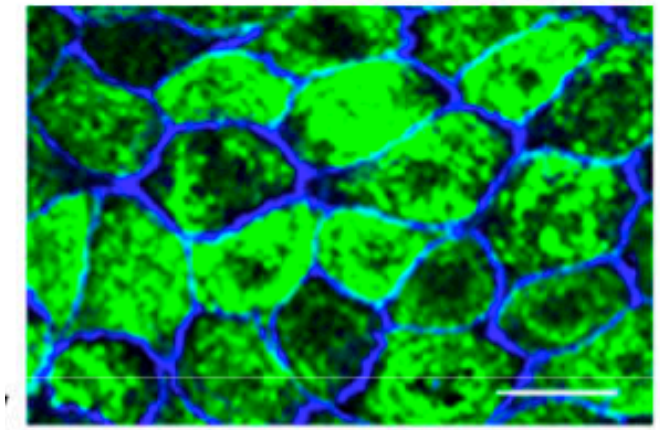
Let's break down the previous slide into its minimum essential components and annotate them

MDCK Kidney cells form a lumen following a change in extracellular [Ca^{++}]

MDCK cells



← Surface view from lumen

gp135 β-catenin ZO-1

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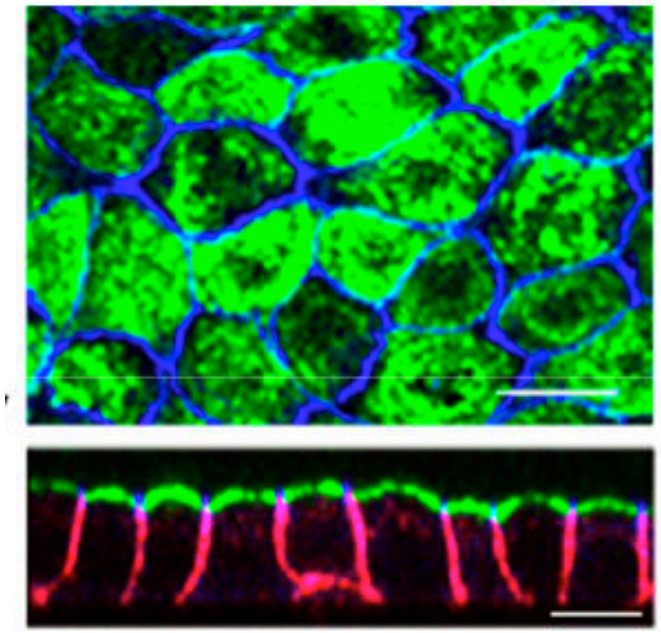


← Surface view from lumen

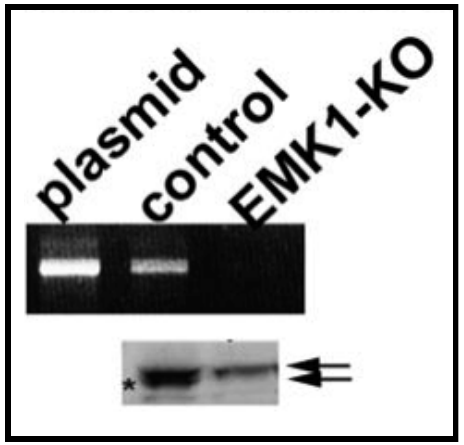
← Side view of lumen

gp135 β-catenin ZO-1

EMK1 / Par1 can be knocked down in MDCK cells using siRNA

RT-PCR

Western



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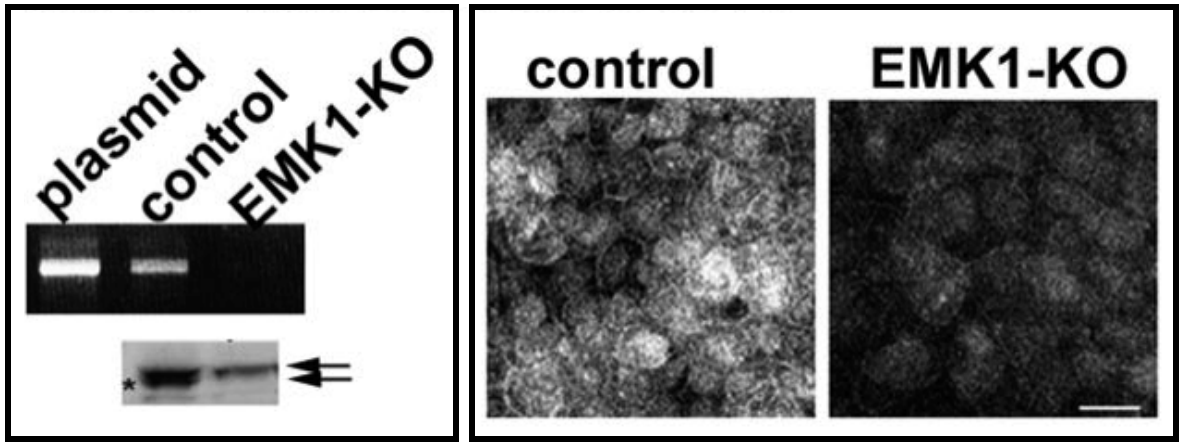
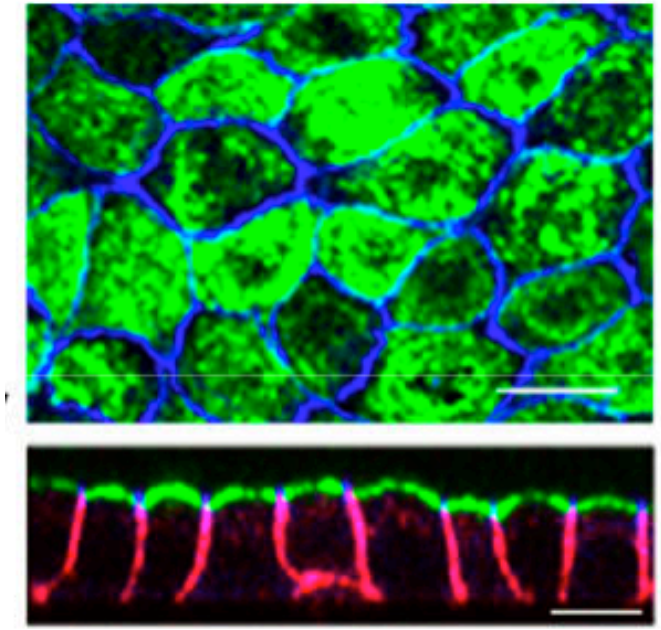


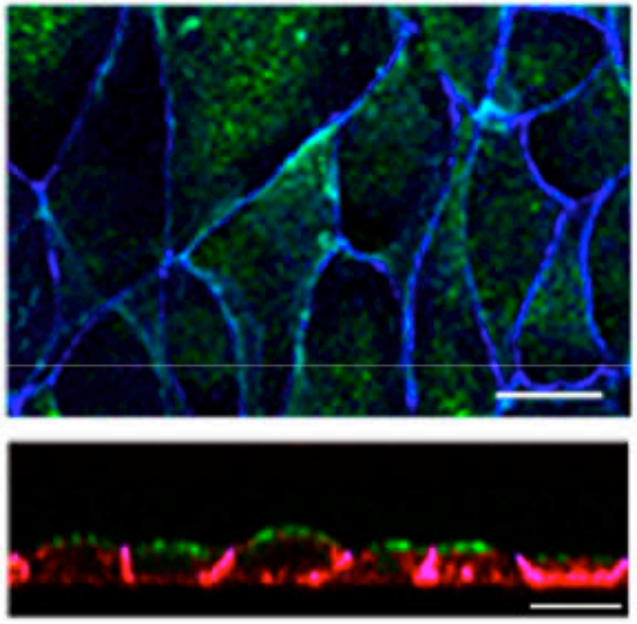
MDCK cells

Lumen formation is blocked in EMK1 knockdown cells

MDCK cells



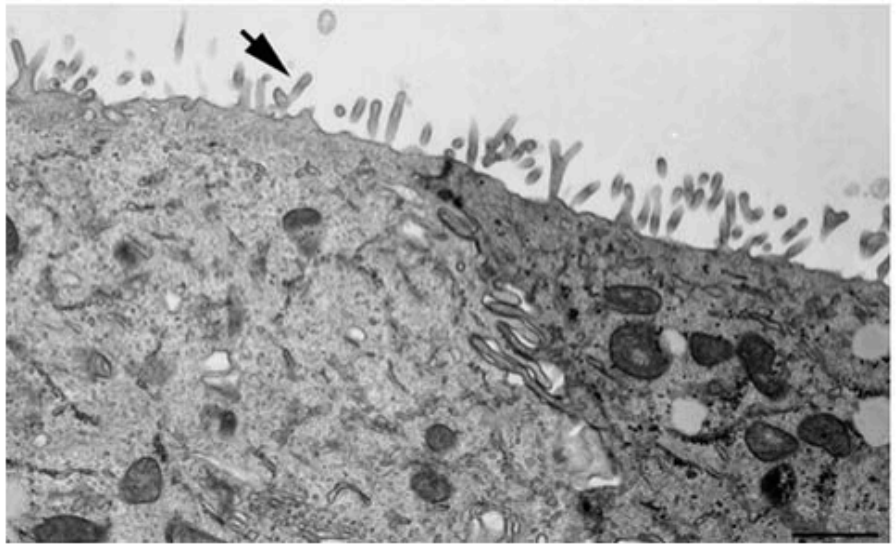
EMK1 knockdown



gp135 β-catenin ZO-1

EMK1 knockdown cells also fail to form microvilli

MDCK cells



EMK1 knockdown cells also fail to form microvilli

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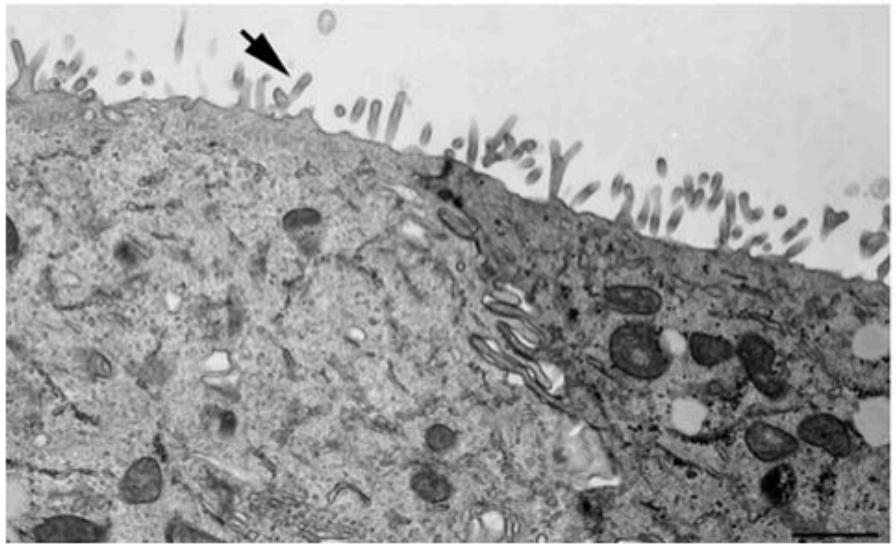
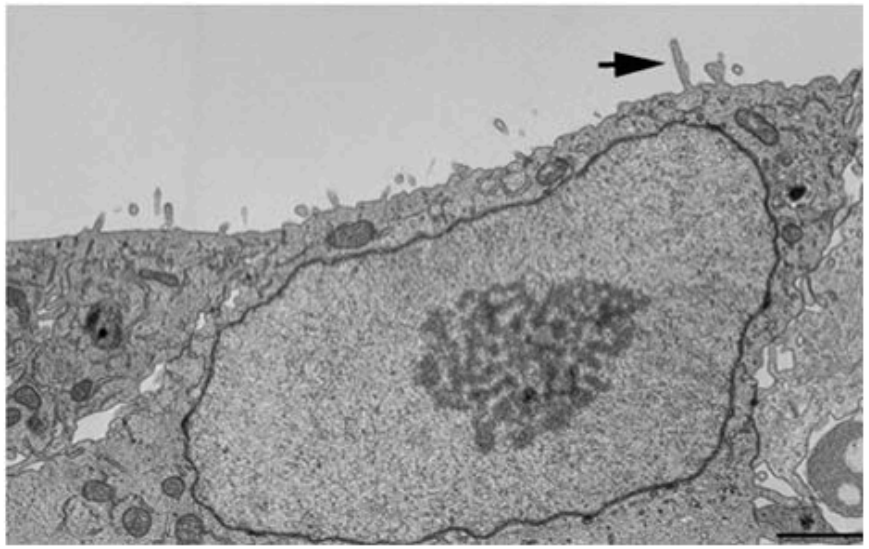


EMK1 knockdown



Question time

How do you feel about question periods?

Answering questions is a skill that you must practice

- Listen carefully to the question
- Repeat it to make sure you understood and give yourself time to reflect on it
- Encourage questions by being positive and not defensive
- If you do not know the answer, just say so, this is not an exam
- Redirect difficult questions back to safe ground
- Work through logic out loud if comfortable
- Remember, your job is to educate and inform, not impress the audience

Hint…

Same skillset you will need for Qualifying Exam

Summary

- Giving a great talk can help the audience understand and remember your science
- Giving a good talk has nothing to do with the data that you are presenting
- Some simple rules can help you organize your talks.

Resources

https://mayaschuldiner.wixsite.com/schuldinerlab/mentoring

http://www.the-scientist.com/?articles.view/articleNo/37697/title/Opinion--How-to-Give-Better-Talks/

http://blogs.nature.com/naturejobs/2016/02/10/a-david-letterman-like-countdown-to-the-10-biggest-pitfalls-in-scientific-presentations/

http://www.howtogiveatalk.com/blog/the-structure-of-an-effective-talk

Uri Alon “how to give a good talk”

http://www.youtube.com/watch?v=5OFAhBw0OXs

Susan Mcconnell “how to prepare an effective presentation”

http://www.youtube.com/watch?v=Hp7Id3Yb9XQ

Simple rules for a simple Layout

- Break down complex slides to simple slides (don't count how many slides you have)
- Every slide should have a one sentence statement as a header
- Limit text blocks to no more than two lines each
- Animate your text
- Try to use a figure instead of text
- Be generous with empty space.

Simple rules for a simple Layout

- If you're not going to take the time to explain it, get rid of it.
- Explain axis of figures shown, result expected and meaning of result achieved.
- A presentation is NOT a manuscript. You don't have to show ALL your data and controls.
- Better use less figures where each one is fully understood than many figures that are only understood by a few of the listeners
- Remake figures in color with larger axes etc (don't use published figures clipped from manuscripts)

“Hook” or opening

- Creative openings (keep it short)
  - A generally held position that you will reject
  - Something surprising or startling
  - An analogy
  - Appropriate short quotation
  - An exhibit – object or video
  - A personal story
- Standard openings
  - Approach to field
  - Research question
  - General argument
- Avoid – ”My talk is on…”, long self-intro, apologetic statement about what you can’t or won’t do

A clear font is very important

Use a Sans Serif font:

This font is Helvetica

This font is Arial.

This font is Comic Sans.

Serif fonts take longer to read…

This font is Times New Roman.

This font is Courier.

This font is Didot.

Helvetica was invented to be the most readable font

It is essential to have large type size for readability

Type size should be 18 points or larger:

18 point

20 point

24 point

28 point

36 point

* References can be in 14 point font

AVOID USING ALL CAPITAL LETTERS BECAUSE IT'S REALLY HARD TO READ!

Your choice of colors can really affect readability

Dark letters against a light background are best for smaller rooms and for teaching.

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

It also depends on your data (microscopy likes dark background...)

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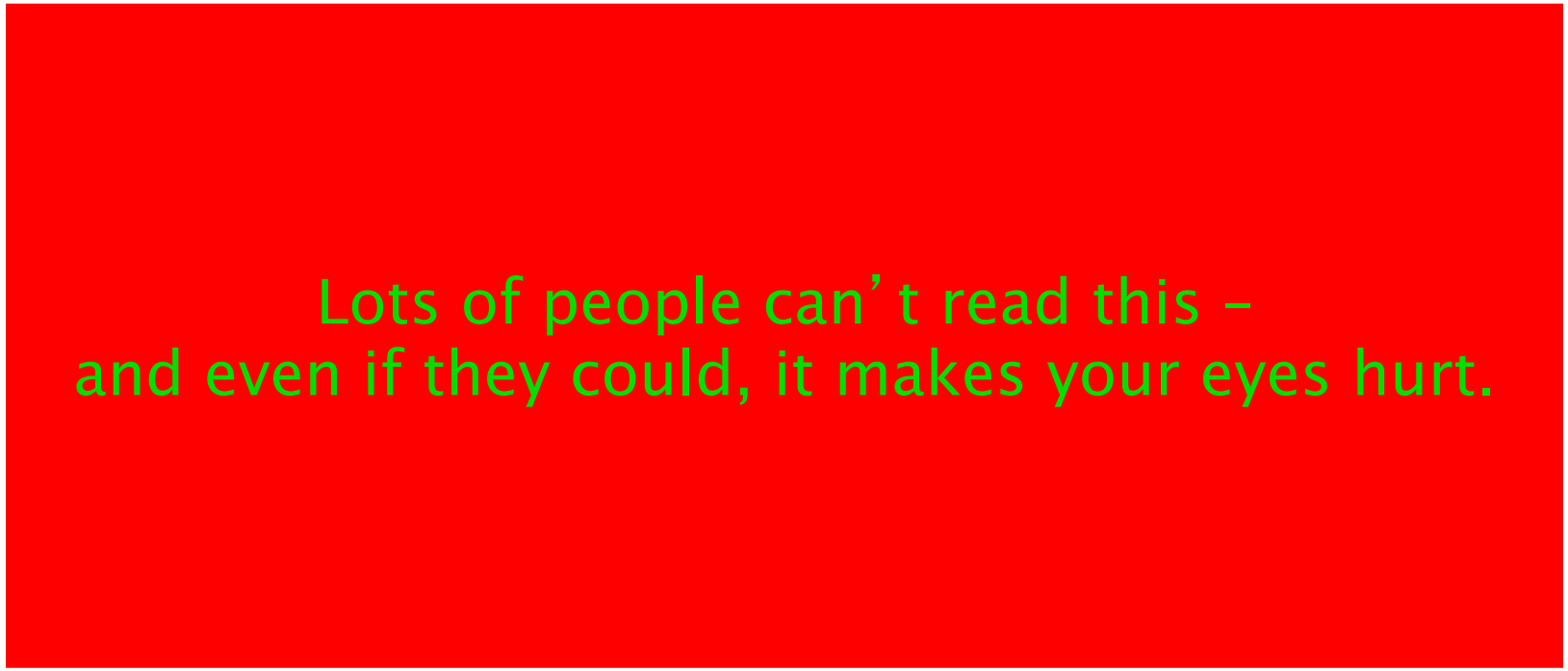
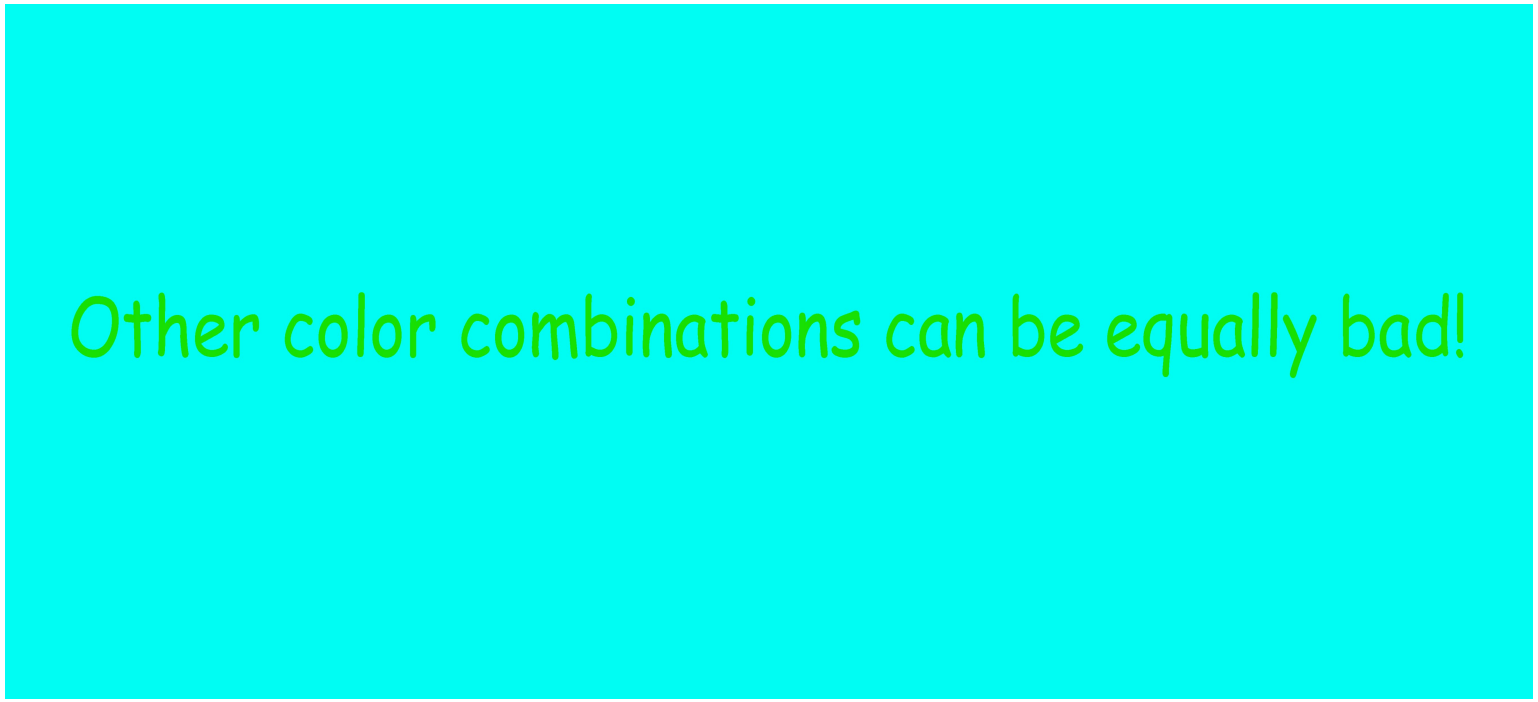
Avoid red-green combinations because a large fraction of the human population is red-green colorblind.



Other color combinations can be equally bad.



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Whatever you decide
Be consistent

Help your audience (and yourself)

- Use “build” slides (new additions on top of an already-presented slide)
- Use consistent labels and avoid non-standard acronyms if possible (“dispersal morph” better than “LW”)
- Practice transitions, use slide headings to help

Practice!

- Get ready in advance
- One dry run is probably not enough
- Gather a group to practice together
- Arrive early, make sure presentation loads (send an electronic backup!), make sure you have a pointer or slide remote

Presentation advice

- Build rapport
  - look audience in the eye, smile, watch their reactions and adjust pace or level accordingly, show personality – humor OK if natural
- Be dynamic
  - Move around (but don't pace or wonder aimlessly), use body language, vary your voice, don't hide behind podium
- Leave time for discussion
  - Finish a little early, don't pack too much in, coast in at a leisurely speed
- Finish strong
  - If you asked questions in the opening, answer them at the end. Come back to your opening
  - Close by saying "thank you". Don't say "I think I'll stop here" or "That about wraps it up"
  - Don't end with apologetic statement "Sorry but I seem to have run out of time…", "Oh, I forgot one point, sorry…"

Capture the eye, ear and mind of your audience

To outline or not to outline?

- Consider outline if talk is longer than ~30 min
- Good outlines:
  - Layout hypotheses and come back to fill in results
  - Tell the audience what to pay attention to
  - Have graphical flow charts showing linkages between ideas, or alternate hypotheses
  - Layout the themes or vignettes that will be integrated to make your main point

To outline or not to outline?

- Bad outlines:
  - Reiterate information everyone knows (E.g. introduction, methods, results, conclusions)
  - Lead people to make false impressions of what's important
  - Are returned to every other slide in a short talk

Take home message: Think judiciously about whether an outline will help you achieve your goals!