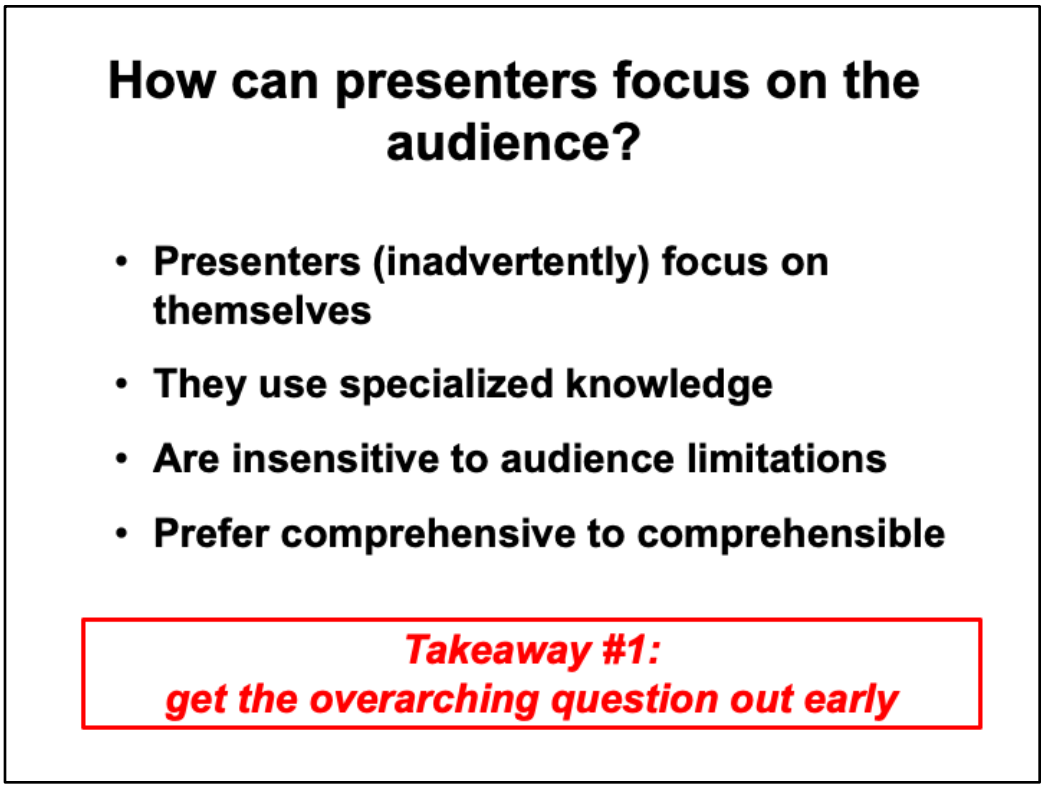
There is a slowly developing crisis of communication in science. Several factors have increased the need for effective communications:

- Specialization has increased;
- Conferences have become too large for useful communications;
- There are more non-native English speakers;
- There is a growing need for "team science."

At the same time communications have degraded. PowerPoint has made it too easy to generate slides and eliminated any discipline in determining what should be presented. Cell phones and email are new distractions.

This document discusses strategies for developing effective presentations. It discusses common strategies for all audiences and points of divergence. But most scientists want to talk to scientists in their subspecialty! Do that first and you can always cut back for general audiences. Right? **Wrong!** If there is one takeaway message, it is to articulate your scientific argument simply and concisely, then add the detail for listeners with greater expertise. **Build up, don't cut down!**

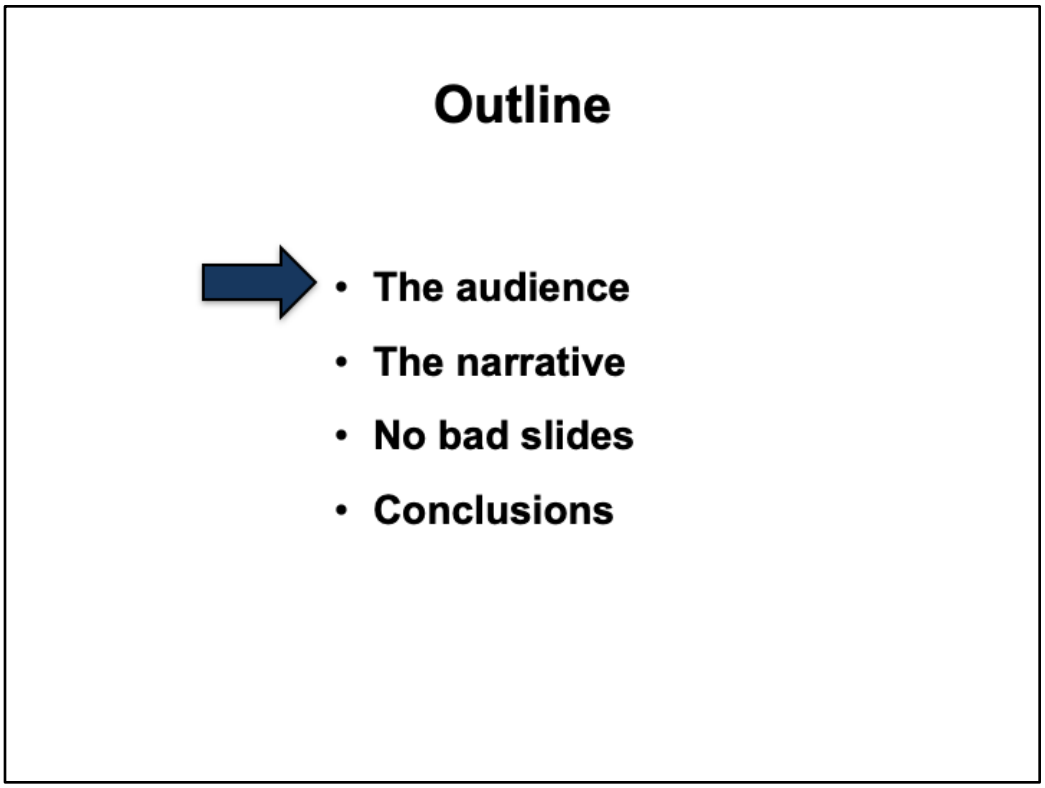


Audiences need to know right away why you are asking them to sit there. We need to get the overarching question out early. Provide the minimum background that will help the audience understand that it is an important question. State it simply, knowing you will have a chance to redefine it with more detail. The central question in this talk involves techniques that help presenters focus on the audience, given the challenges described on this slide.

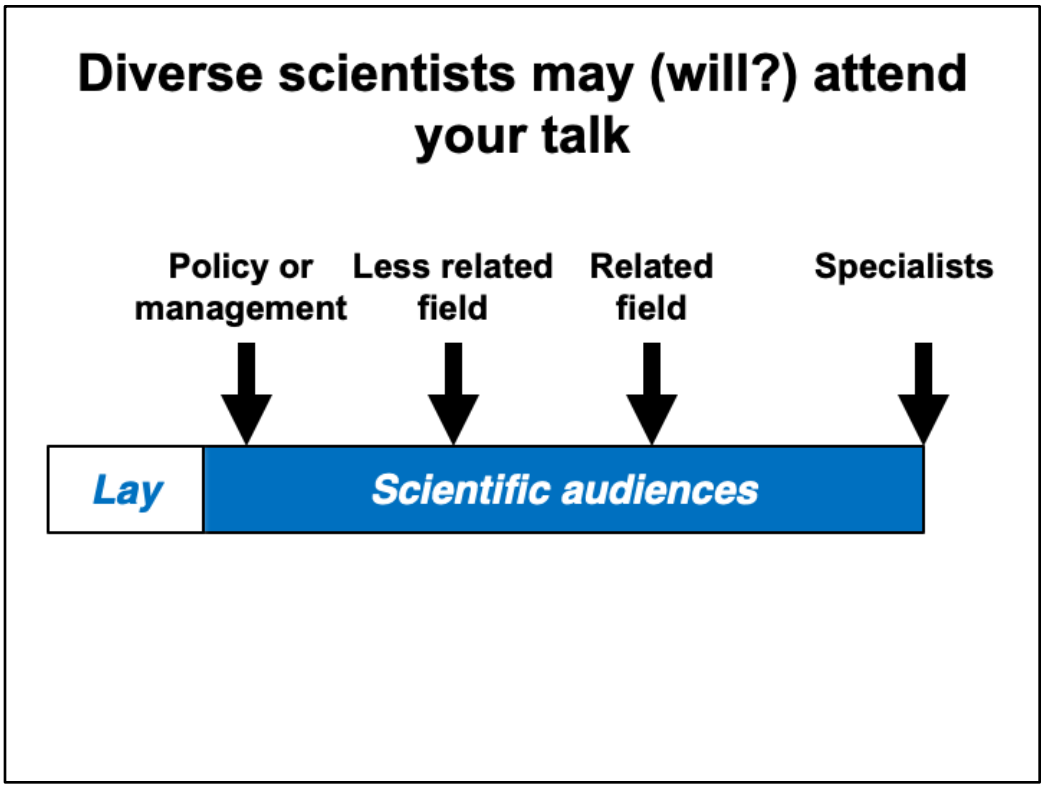
A central problem is that presenters inadvertently prepare presentations for themselves. They don't mean to, but it seems to be part of human nature. They (myself included) tend to use vocabulary and knowledge that is unique to their sub-discipline. They tend to ignore audience limitations; both the audience's limited ability to comprehend new information and the disciplinary span of audience members. We all love our own work; creating a tendency to include every bit of information at the expense of effective communication.

Being aware is not enough. We slip back on each slide we create. We need specific techniques to help avoid the problem.

A talk need not completely answer the overarching question. It might partially answer it, provide some insight into potential answers, or even describe a future approach to addressing it.



I will first review a bit about how speakers should evaluate their potential audiences. A key part of that is to create a narrative prior to making slides. I will then discuss techniques for making audience-friendly slides before concluding.

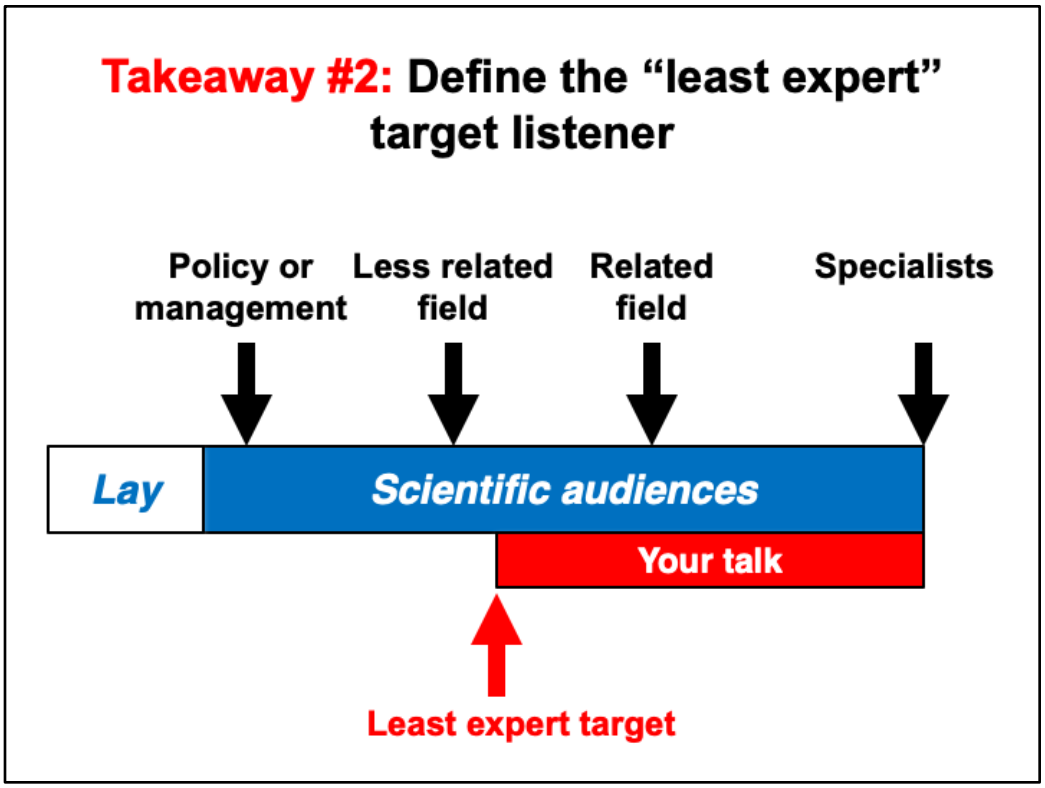


One question I get when teaching my course of presentation techniques is, “are you teaching me to prepare a talk to other scientists or to a lay audience?” This is usually a question students ask in the hope that the answer will allow them to use all the specialized knowledge and vocabulary that is unique to specialists in their sub-discipline.

Scientific audiences are highly varied and audiences for most scientific talks will include a range of scientists; some more familiar with the speakers sub-discipline and others less so. The above figure captures this span, with those on the right having more specific knowledge about the speaker’s content.

A typical goal of a scientific talk is to encourage multi-disciplinary collaborations. It is rare that you would want to prepare a talk only for people in your sub-discipline.

Also keep in mind that many people in government and industry are former scientists who have moved into management or policy. Their ability to understand a scientific talk is still far greater than those of a lay audience (which can be diverse as well).



You rarely know who will show up to your talk and what they will know, so you need to make some educated guesses about your audience and define your own goals for the talk.

Decide the range of audience you hope to reach. Not every talk will be accessible to all audiences. You need to decide what span of expertise you hope to address.

Most importantly, you need to identify the kind of audience member with the least specific knowledge that you hope to reach. I call this the "least expert target." The overall arc of your talk needs to be comprehensible to that type of person, even if a few of the slides are meant for the specialist.

write a short narrative

The key to ensuring that the “least expert target” can understand the overall arc of the talk is to first write a narrative.

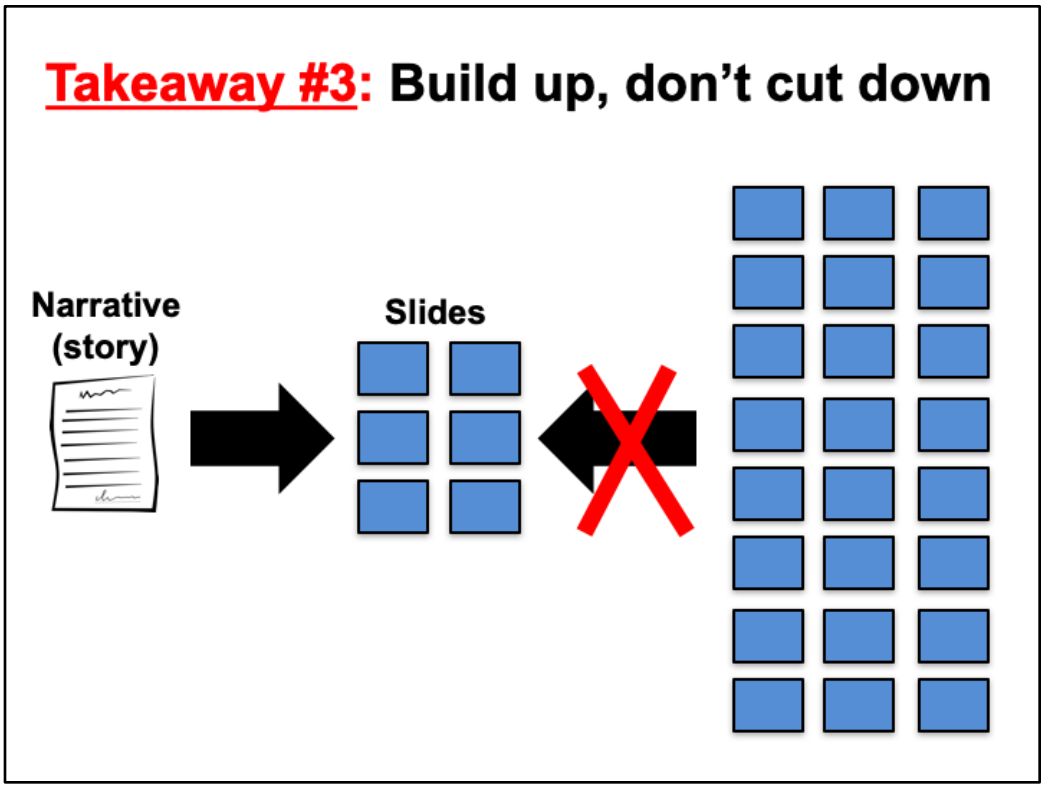
Paragraphs are a far better way to define a coherent story than slides. Write a very short narrative of the story (one page or less). What is the problem? Why is it important? How will you address it? What results did you achieve? What will you conclude? What are the remaining uncertainties? What experiment needs to be done next? This little essay is qualitative, don’t include data.

It will shock you how little the audience will understand unless you take the time to figure out the complicated parts.

To do this, try verbally communicating your narrative to a colleague at the next lab bench. They'll tell you a few things they didn't understand. Then try it with a scientist that is not in your lab. He/she will let you know about additional confusing terms and concepts. Keep working down until you can explain the story to the "least expert target."

The ability to tell your story at a simple level is an important part of giving a complex scientific presentation. As you struggle to decide what detail to add and what concepts not to introduce, etc., the simple narrative is your guide. The points in the simple narrative are the points you need to shine through the more detailed story.

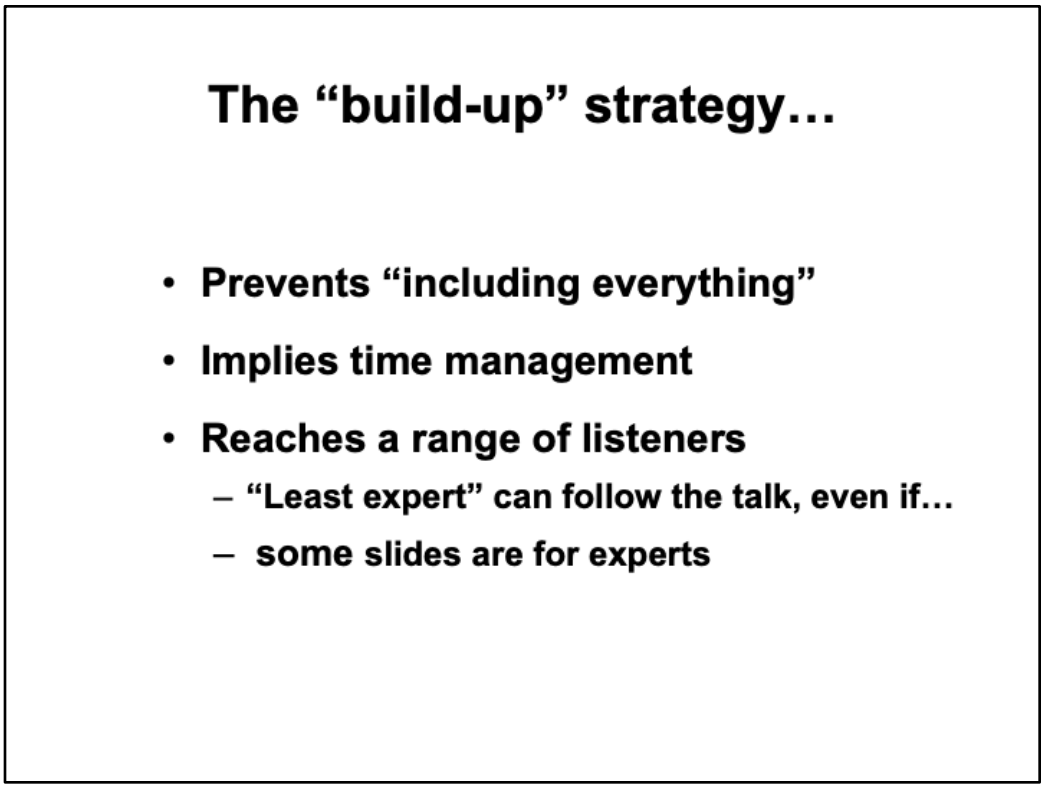
This slide conveys my concerns about programs aimed at teaching scientists to communicate with lay audiences. I think there is a (false) assumption that scientists are already good at speaking with each other and they just need to learn to speak with laymen. Wrong! It is easier to first teach someone to speak with audience that shares common knowledge and training. Scientist-to-scientist communication training is a prerequisite to scientist-laymen communication training.



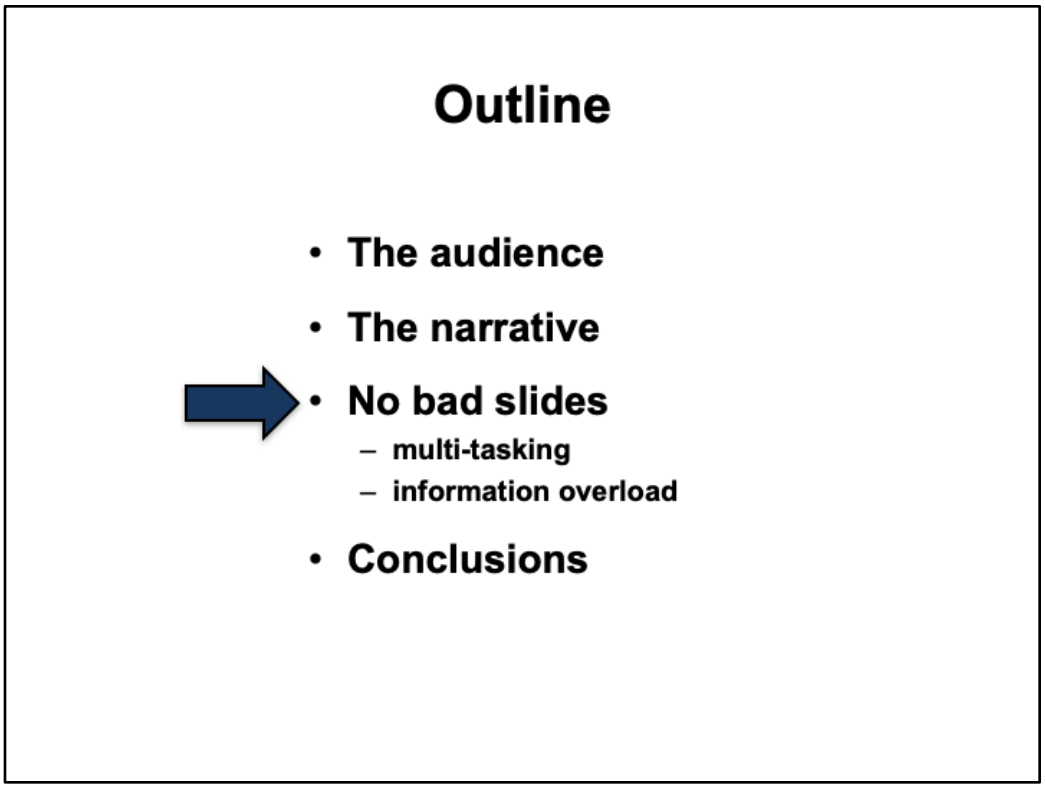
Your narrative is the basis for building your presentation.

The worst way to build your presentation is to to start with a mountain of data and hundreds of slides (the little blue boxes) and ask, "What can I cut?" Instead build "up" for the allotted time and ability of the audience to understand detail. Develop a one minute version of the entire talk, then a 5 minute version, 10, etc.

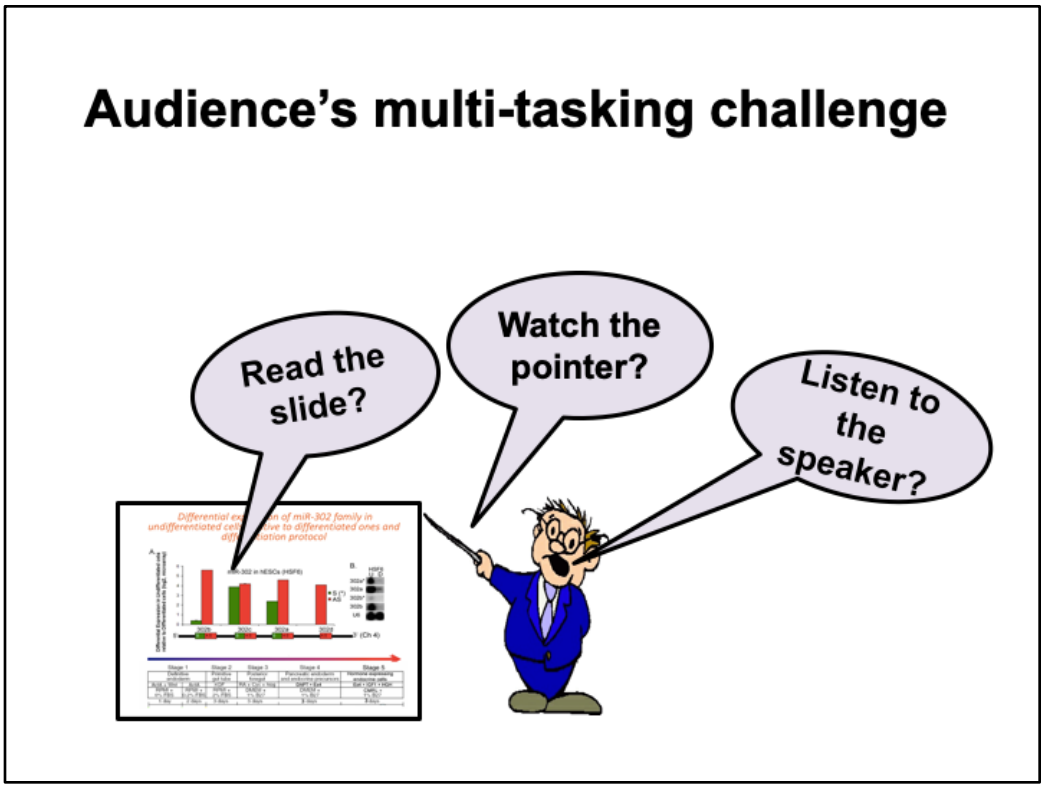
When trying to "cut" everything seems essential and it seems impossible to eliminate content. You end up with a multitude of complicated slides. This approach avoids that problem. You need to figure out what to add, not what to cut.



The build-up strategy has several advantages. If you “build-up” for increasing amounts of time you have a built in time management strategy and one that forces you to prioritize all your information. It also provides a structure for reaching the appropriate range of listeners. As long as your initial short version can be understood by the “least expert target,” then it is OK to add some detail that only the specialist can appreciate.



Next we turn to the problem of creating individual slides that are focused on audience needs. I will discuss two key challenges.



Multi-tasking is perhaps the most critical listening challenge. Slide presentations ask the audience to watch the speaker, listen to the speaker, read the slides, and watch the pointer. The only reason to have a slide presentation is to create communication synergy among these modes. Otherwise why show slides or conversely why discuss them? Too often the speaker's words and the visuals are disconnected and the audience is confused. The job of the speaker is to explain the slides. The pointer is critical. When talking about a particular part of the slide, point to that part of the slide. Help the audience every step of the way.

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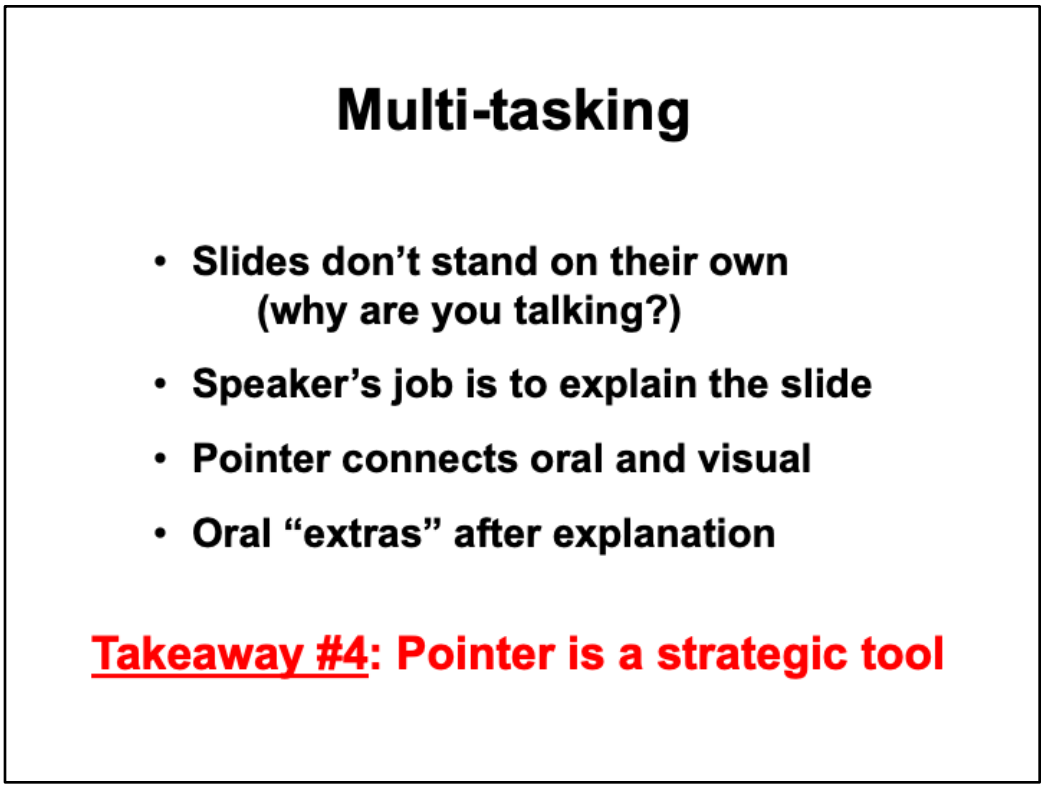


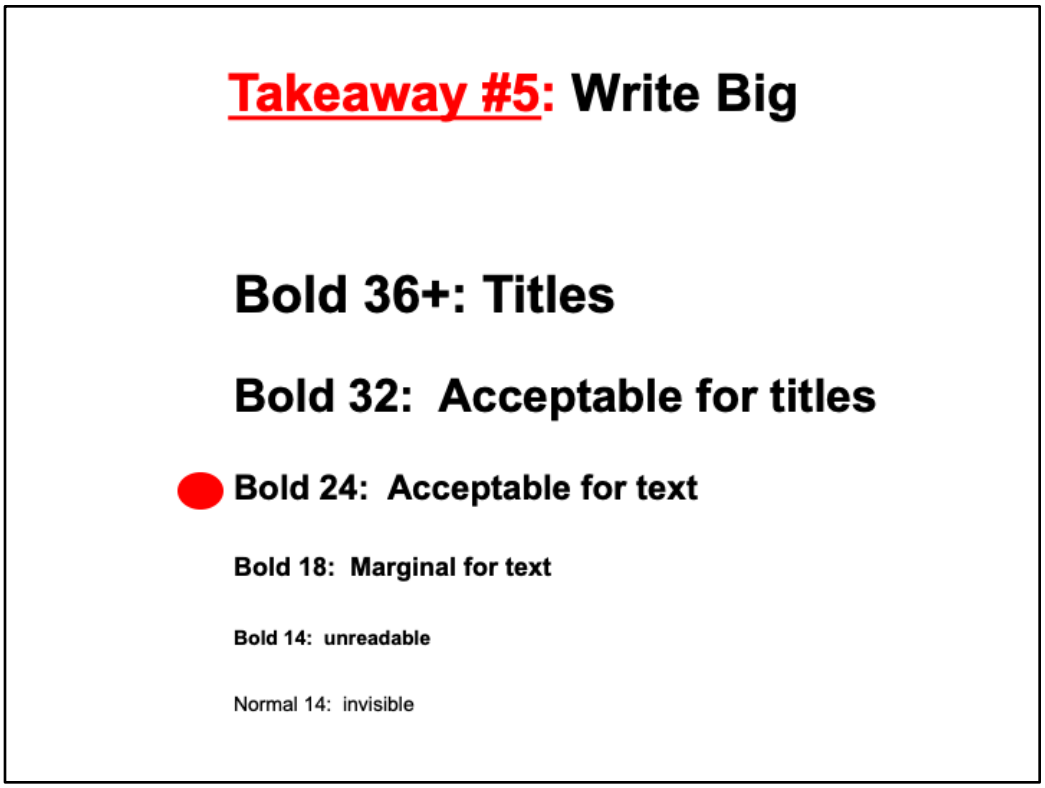
Helping the audience overcoming the multi-tasking challenge is central to a successful oral presentation.

First slides should not stand on their own. If a slide has all the information the audience needs then there is no need for the speaker to talk.

Your primary job as speaker is to explain the slide. Don't talk about other things ("extras") until after you have explained the slide. The audience won't listen to you if you do so, they will be fixed on the slide.

Use the pointer to point to the part of the slide you are talking about. The audience has never seen the slide and they won't know what part of the slide you are talking about unless you point to it.

Use the pointer with discipline! It is a strategic tool.



Equally important is to avoid overloading the audience with detailed information. Generally slides are on the screen for only a short amount of time and the audience is limited in what they can absorb.

To avoid this problem, write big. There are two reasons: 1) people can't see small fonts and 2) it imposes discipline on the presentation creator.

24 bold is what I start with for text.

I can hear you now, "I can never get what I need to say with 24 bold font." You are trying to say too much. Also you don't need grammatically correct sentences. Words should be cues that are elaborated by your voice. Remember, a presentation is the synergy of voice, visual, and pointing.

I give you permission to use 18 bold for text, but try to avoid it. Assume that anything less than 18 bold is unreadable.

There may be times when you need to show smaller font. Perhaps you want to copy an easily recognizable graphic that contains small font to help orient the audience. Point to the small font and tell the audience they don't need to read it and you are only showing it to represent something they recognize. You have to help the audience every step of the way.

Stanford Cancer Institute Program 10 Plans Presented for next 5 Years

- **Tailoring lifestyle interventions and assessment research to populations at greatest risk for specific cancers**
- **Expanding community health and health disparity research**
- **Enhancing intraprogrammatic collaborations among CPCP investigators to develop a cohesive research agenda**
- **Identifying translational opportunities and building strong inter-programmatic collaborations, *particularly with Cancer Epidemiology Program (9) members and Immunology Program (7) members*** ****emphasize other programs**
- **Strengthening our health policy research agenda**
- ***Enhancing and exploring current and new collaborations with cancer researchers at other institutions***

Stanford Cancer Institute
A National Cancer Institute Comprehensive Cancer Center
Stanford MEDICINE

Let's continue considering "information overload" by taking a look at a slide that clearly has too much information for the audience to digest.

This slide talks about future plans for Cancer Institute Research Program 10. Can we improve it? There are too many words on the slide for the audience to simultaneously read the slide and listen to the speaker.

There are 3 options: 1) we can let the audience read the slide and not speak, 2) we can speak and not use a slide, or 3) we can try to figure out the point we are trying to make and redesign the slide around that point. Options 1 and 2 have nothing to do with a slide presentation. Option 3 goes to the heart of why we do slide presentations; to create a communication synergy among voice, slide, and pointer. We want to create something more powerful than voice or visual alone.

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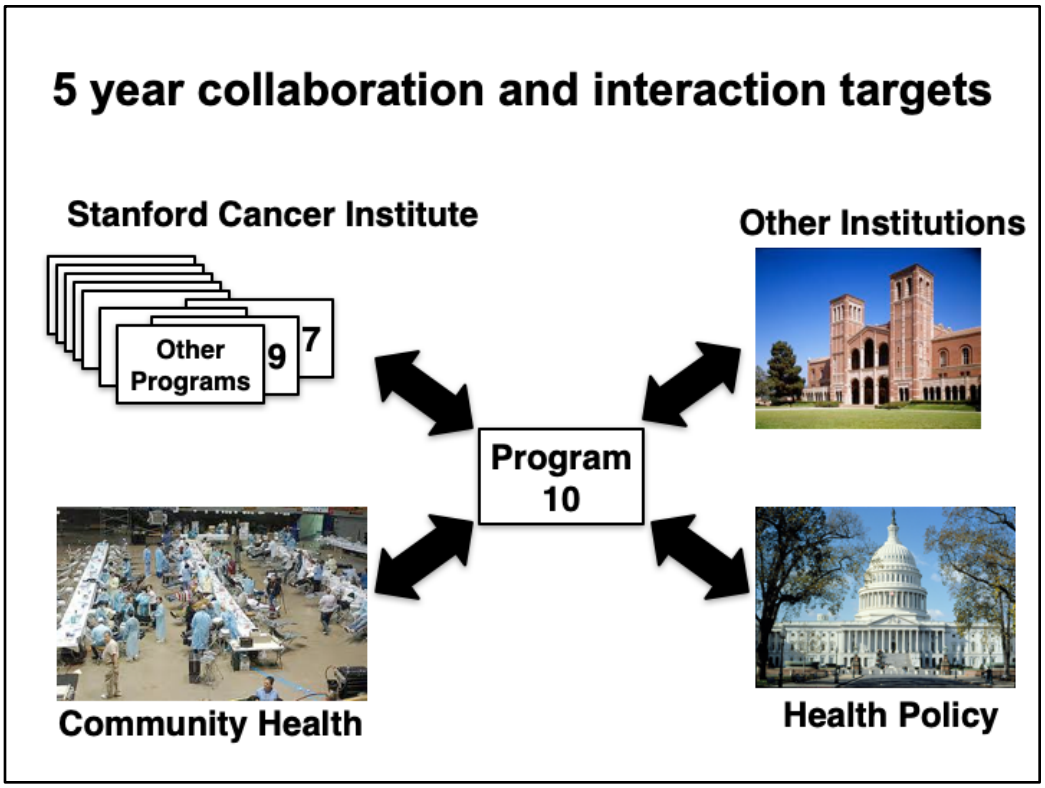
Stanford Cancer Institute
A National Cancer Institute Comprehensive Cancer Center
Stanford MEDICINE

Let's examine the previous slide and see if we can decipher the author's intended message (if they had one).

The highlighted words focus on one potential message. A major goal of research program 10 is to reach out to new collaborators and audiences. These include the local community, other Cancer Institute research programs (particularly program 7 and 9), the health policy community, and other academic institutions. It is up to the presentation creator to help the audience figure out the message.

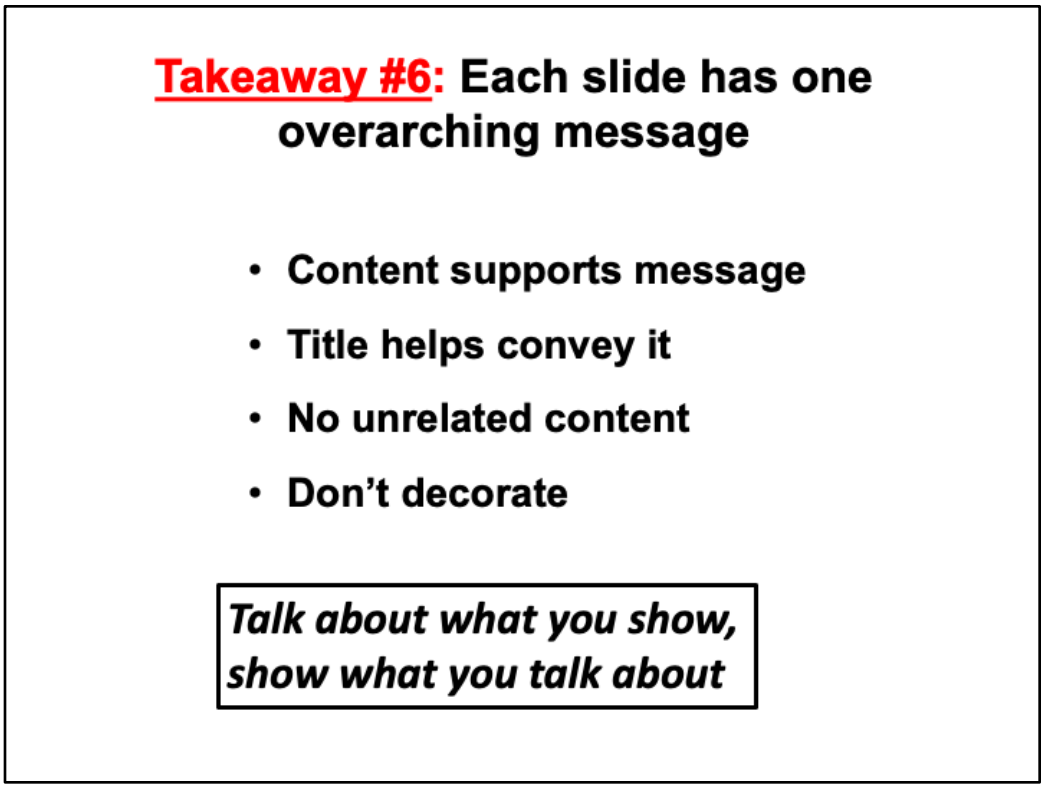
Too often presenters show slides without asking themselves, "What do I want the audience to take away from this slide?" That old issue of the "take home" message is relevant at the overall presentation level, the section level, and the individual slide.



Voila! The replacement for the previous slide. Program 10 seeks to reach out to other programs in the Stanford Cancer Institute, particularly programs 7 an 9. It will also reach out to other academic partners, the local community, and the policy community.

Not only is this more focused, but it allows the audience to spend their time thinking of questions rather than deciphering wordy slides. For example, "do we mean federal policy only?" "Will we work with the community through existing providers or will we form our own direct connections with patients?"

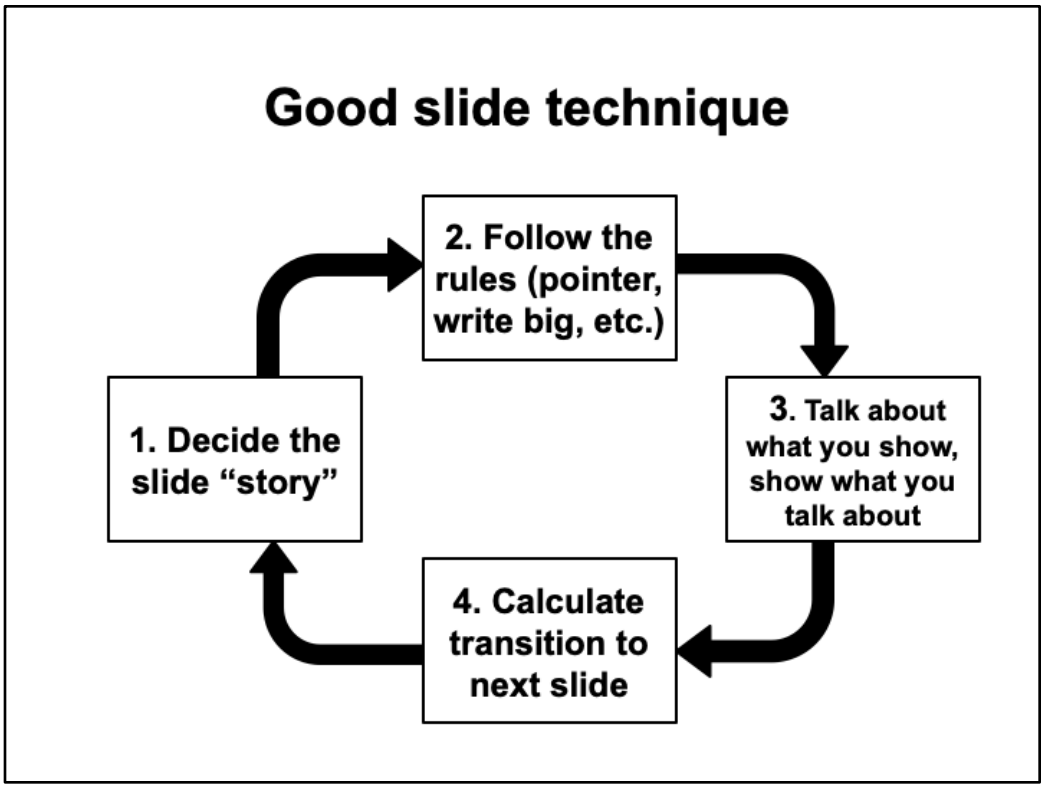
A picture is worth a 1000 words. You will get the audience to think more with a simple picture than by listing every variation in text. If you have a slide presentation dominated by text slides, ask yourself if you should be even showing a slide presentation. If you want to show a lot of numbers, maybe a few handouts and a discussion are better than slides.



Each slide should have one overarching message. The title helps convey that message and the content of the slide supports the message. Remove content that is unrelated to that message and don't decorate (e.g. pictures at bottom of the bad slide examples shown previously).

Don't use fancy templates, in fact no template is best of all. If you need to show a template, use it on the title slide and then drop it.

In other words, "talk about what you show, and show what you talk about." If you don't talk about something that is displayed on the slide, ask yourself why it is on the slide. 99% of the time you can take it off.



This slide summarizes how to build individual slides.

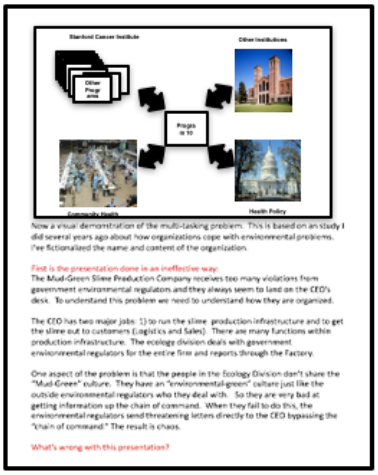
Step 1: Decide the overarching message (or story) of the slide. What is the point the slide is trying to make?

Step 2: Follow the rules we've discussed for slide design. Don't decorate!

Step 3: Get your words and your visuals in sync and cut out visuals, and parts of visuals, that aren't discussed.

Step 4: Figure out how you're getting to the next slide and repeat the process for the following slide. When doing dry runs, think about how the last thing you say on one slide leads into the first thing you say on the next slide.

Takeaway #7: “Notes view” for detailed leave-behinds!”



Now a visual demonstration of the multi-tasking problem. This is based on an study I did several years ago about how organizations cope with environmental problems. I've fictionalized the name and content of the organization.

First is the presentation done in an ineffective way:

The Mud-Green Slime Production Company receives too many violations from government environmental regulators and they always seem to land on the CEO's desk. To understand this problem we need to understand how they are organized.

The CEO has two major jobs: 1) to run the slime production infrastructure and to get the slime out to customers (Logistics and Sales). There are many functions within production infrastructure. The ecology division deals with government environmental regulators for the entire firm and reports through the Factory.

One aspect of the problem is that the people in the Ecology Division don't share the "Mud-Green" culture. They have an "environmental-green" culture just like the outside environmental regulators who they deal with. So they are very bad at getting information up the chain of command. When they fail to do this, the environmental regulators send threatening letters directly to the CEO bypassing the "chain of command." The result is chaos.

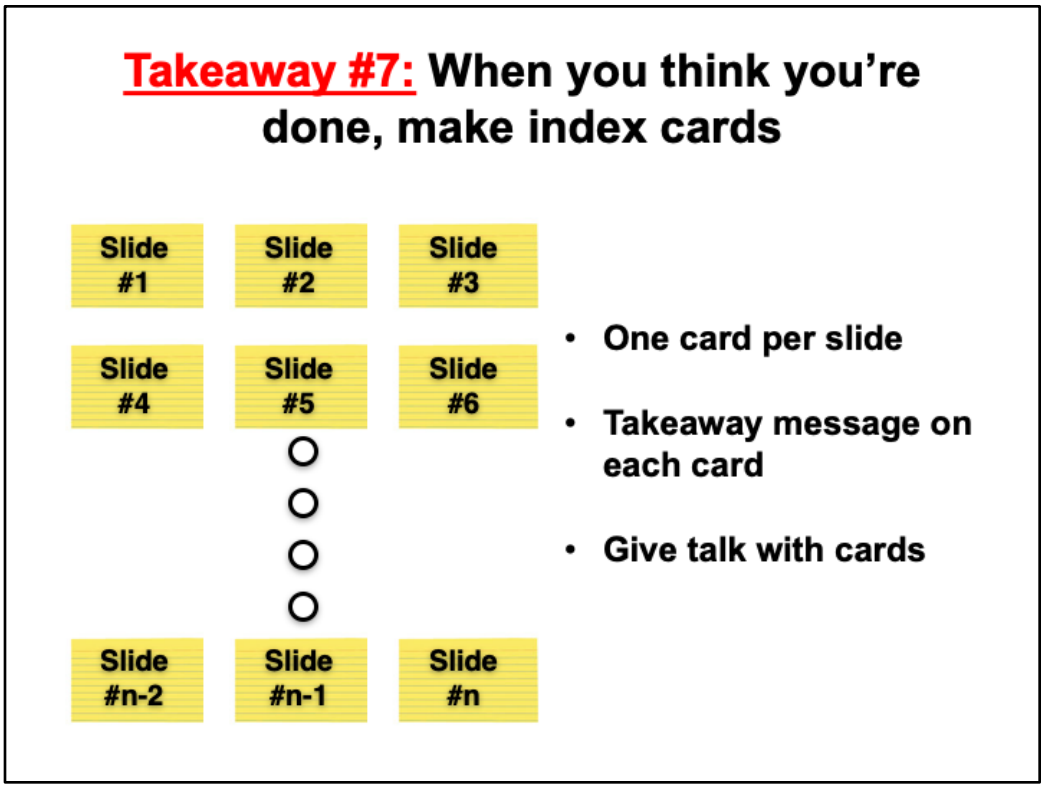
What's wrong with this presentation?

Writing text helps your oral presentation!

One complaint I often get with my approach is, “I need all the detail on the slide because I’m going to leave a copy behind.”

Remember slides should not stand on their own, or else why are you talking?

If you need to leave a copy of the slides behind, use the “Notes” view to supplement the material on the slide with the content of your oral presentation.



You've followed all my instructions and worked really hard, so you think you are done, right? Wrong! Every time you give the presentation you will uncover ways to relate the same content with fewer words, fewer slides, and less overall detail. A slide presentation should get tighter with time and repetition.

One way to short circuit that "learning" process is to utilize the index card method. Make a card for each major slide and write the takeaway message on each slide (which might be the title of the slide). Try rehearsing the presentation with only the cards. Don't worry about including all the detail in your oral presentation, use the cards to develop a smooth telling of the overall "story." You can experiment with changing the order to see if that improves the flow of the narrative.

You can also use this method earlier, after creation of your initial narrative, and well before making any detailed slides.

The Worst Words in Science?

"I'll write the presentation on the plane"

Just a reminder that all this takes time. Presentations are hard to create and they improve every time you give them.

A few years back I assisted a senior academic prepare a presentation for a donor. I suggested we "dry run" the presentation. That was rebuffed with the response, "I have given hundreds of presentations…" Needless to say, it did not go well.

Preparing a presentation can add to the quality of your research. It is an opportunity to think through what is important and what makes a difference. It provides a pause from the detailed lab work and emails. It is an opportunity to be strategic.

We face some funny incentives! Many scientists are too busy giving presentations to dedicate the time to prepare a good presentation. Are 20 incomprehensible presentations better than 2 or 3 great ones? Many scientists do not want to spend an extra 3 or 5 hours improving their presentation, even though it may result in 75 scientists (the audience) wasting an hour.