OSA Blog: Effective Presentations

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Presentations are not just great opportunities to explain your results to a broader community, but also moments for you to get in touch again with the big picture of your work, to consolidate your own thoughts, and perhaps to make new realizations. These events are also important social occasions for networking, learning about new areas of research, and establishing new collaborations. Presenting yourself and your work in the best way is crucial, but effectively communicating your work is a separate skill besides the expertise required to obtain your scientific results. Even experts can get lost in your talk if not articulated correctly. Explaining only *what* you did is not enough. People need to be convinced of *why* you did something before they give credit to the *how* and *what* [1]. As humans, stories are what catch our attention, so we should present our work in the form of a story that draws people in and takes them on a journey to the profound results we have discovered. A general picture that can help you communicate in this way is that of a skewed hourglass: start broad and general (why), give context with your methods (how), narrow into your specific contributions (what), and broaden back out to your work's impact to the bigger picture.

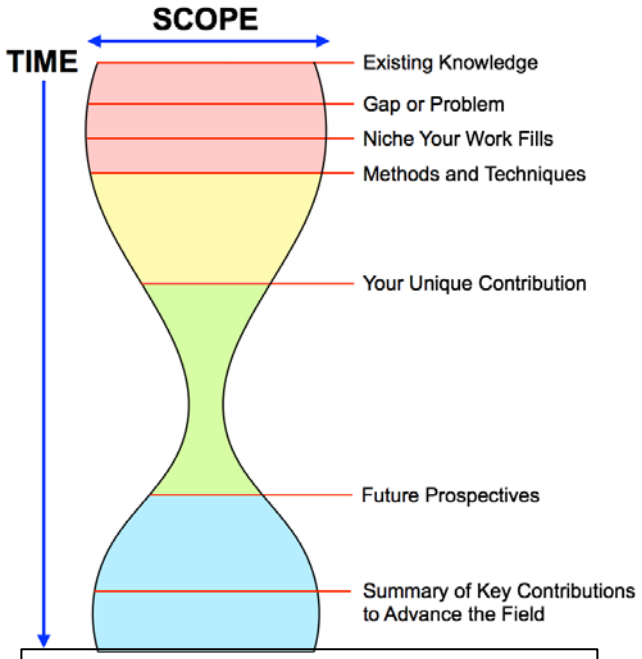
For anyone at any career stage who wants to improve their presentation skills, some tips and suggestions for crafting an effective presentation are in the linked PDF. The assumed context is a technical talk with slides. We will explore how to construct the slides, styling recommendations, and advice for preparing to speak. This is a starting set of guidelines that you can adapt to your own style!

CONSTRUCTING THE SLIDES

Why are Pixar movies so great? They create great stories! You can do the same with your presentation. One study nicely discusses turning your results into a narrative story that is easy for listeners to follow and also boosts your confidence as the presenter [2]. Here on some tips on how to go about crafting your talk.

1. **Know your audience, and keep this in mind as you are constructing the talk.**
    a. Are you speaking to a group of experts in your field? Then don't spend time on the general basics, i.e. if you are at a terahertz conference there is no need to tell people where terahertz is in the electromagnetic spectrum.
    b. Are you speaking to a mixed technical audience? Then be prepared to give context and clear reasoning to each method and decision of your research process.
    c. Are you speaking to a general population? As much as we love the details, this group will not be able to follow every minutia and so they will not benefit from a detailed breakdown. In this case, focus more on the big picture and the end impact of your particular work.
2. **Write, iterate, revise.**
    a. Your talk is like optical alignment, you need to iterate till you converge on a well-aligned system.
    b. What is the storyline of your work? Often I will make a draft of the talk with only the titles of all the slides, like "storyboarding" scene by scene of a movie, and then go back to fill in all the details (discussed more below).

3. **Start with the main point of your contributions, the center of the hourglass.**
    a. This is the narrowest part of the scope, and should contain all of the (audience-appropriate) details of your unique contributions. Often this part, the *what,* is the easiest part to write since this is your area of specialty.
    b. What is the take-away message? What are the essential key results you need to show? What is your novel contribution to the community?
    c. Starting with this section boosts your own confidence (you should be proud of the work you've done!), and also gives you a clear goal to work towards as you construct the technical storyline that builds you up to this point.



Outline of an ideal talk with a skewed hourglass shape starting broad, narrowing in to your specific topic, then expanding back out to connect your work to the bigger picture.

4. **How does your work fit into the bigger context?**
    a. This is the top of the hourglass, beginning with the largest scope and discussing the *why* of your research. If you can convince people here, then they will be interested in the rest that you have to say.
    b. What application to humanity does your work address? We like science for the sake of science, but ultimately we should connect our research to the real world. (This point is especially key for future funding.)
    c. What already exists in this area? Make sure to cite the seminal work that has inspired your research.
    d. What is the gap or problem in the existing knowledge that you address? Cleary state the open questions in this topic and areas that need improvement.
    e. How does your work fill this niche? Here give "the punch-line" first by stating your take-away message in the beginning. This will entice the audience to keep listening till they find out all the details of what you did.
    f. Bonus: Spaced repetition is a main way humans learn [3], so repeating your key contributions throughout the talk will have a greater chance of being remembered!
5. **How did you accomplish your work?**
    a. Here the scope begins to narrow. What is the pathway you need to construct in order to go from the big picture to your specific results? This is the *how*.
    b. What foundational information do you need to establish? Start from a few first principles and build towards your specific topic.
    c. What methods and techniques did you use? Give enough context for the audience to understand the advantages of employing these methods. Also, discuss the limitations. Addressing both what CAN be understood, and what CANNOT be understood in your chosen technique ensures that you will not obtain any false-positive results and gives your work more credibility.

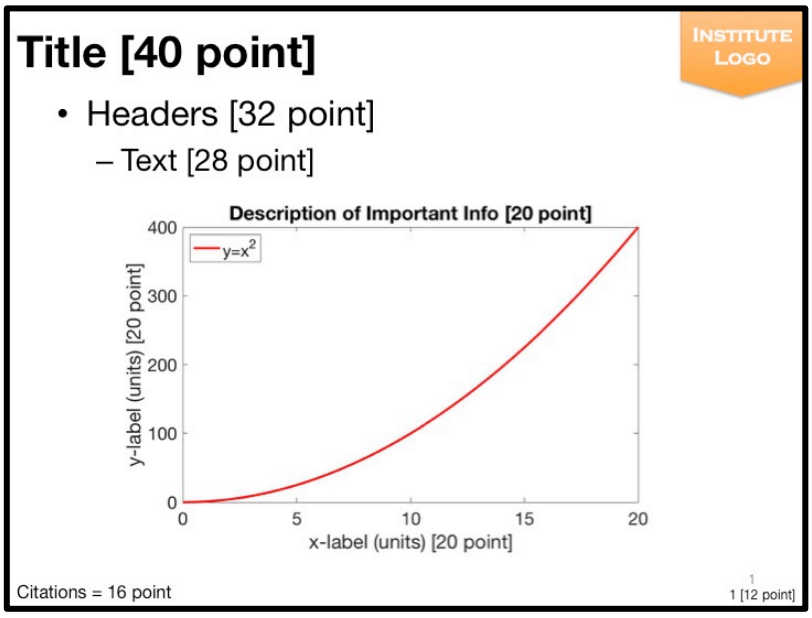
6. **Refine your unique contribution section.**
    a. With the first part of the talk now written, adjust how you present your key results so that the connection is smooth.
    b. Check that the weight of your contribution is clearly stated. End this section with a brief summary of your important results.
7. **Discuss future plans.**
    a. Now expand the scope back out by connecting your specific work to the bigger picture.
    b. What is the immediate impact that your work has? What are the possible long-term impacts of your work?
    c. What are the next steps you plan to take?
    d. This is also a great opportunity to solicit new collaborations.
8. **Summarize in your conclusion.**
    a. In the final slide, reiterate your significant and unique contributions and connect back to your impact on the broader field. (Remember, repetition is key!)
    b. Instead of using bullet points, create a composite figure of your most important results to summarize. Ending with this image is especially helpful to make your work more concrete in the mind of the audience.
    c. During the Q&A, leave this slide up to prompt more questions.
9. **Check your story.**
    a. Flip through your slides. Is the storyline continuous? Are your main points really emphasized? Revise and iterate!
    b. A good rule of thumb is about 1 minute per slide. Make sure your talk has not too much information for the allotted time, and also not too few information.

STYLING RECOMMENDATIONS

We all have a particular style, but there are some design elements with general consensus. In this post, I list some of my pet-peeves when it comes to designing a presentation, and some general guidelines.

1. **Recognize your co-workers:** Personally, I prefer at the beginning of the talk to give recognition and thanks to the others who contributed to the topic as well as the institutions and funding that provided the resources to do this work. To me, doing it at the end does not give the proper recognition that my colleagues deserve. The science outcomes would not have been possible without the contributions of the team. Using photos helps to "humanize" your work too.
2. **Outline:** To include an outline or not, that is the question… If the talk is 15 minutes or less, don't include an outline slide. You already have so little time to talk. Although there is debate about human attention span [4], many accept the attention length for lectures (meaning a monologue of information) lasts around 10-15 minutes, so people should be able to follow. If your talk is longer than 15 minutes, then include an outline, and be clear about the transition points to new sections throughout your talk.
3. **Images:** Use more images and as less text as possible. Truly, a picture is worth 1000 words. For plots, verbally discuss the important elements such as the axes, the dependent and independent variables, any error considerations, and most importantly the key trends or interpretations of the data. Use text on the slide only to emphasize the key take-away from the graph.

4. **Font size:** For the text you do have, it is important to make sure that it is readable (especially for axes labels). Some starting size recommendations: Title = 40 pt, Headers = 32 pt, Text = 28 pt, Citations = 16 pt, Page Numbers = 12 pt, Plot Axes = 20 pt. A sample slide is shown with the values. Also, if you want you can include your institute logo on the slides to remind people of the place your amazing work was accomplished.



5. **Citations:** Make sure to cite previous work on the slide where mentioned. Typically the list the first author or group leader, journal name, volume number, year, and sometimes the full title as well.
6. **Transitions:** Besides having good content, what makes a good talk into a great talk are well thought through transitions. Know your storyline. Be mentally clear on the arc of the story you have developed to tell your results, and be able to flow smoothly from one section to the next.
7. **Number your slides:** This is helpful especially if someone has a specific question and they can refer to the slide number.
8. **No last minute changes:** Try not to change your slides within the day prior to your talk. If there is a glaring mistake, of course fix it. Otherwise, despite your earnest effort to improve your slides, you may likely forget that you made that change while presenting.
9. **Be yourself:** Include your personality in the talk. Even though we are all scientists, we are firstly humans. Our attention and interest is engaged more when there is an emotional connection. This can be created by incorporating humor, displaying your excitement for the topic, or especially by sharing the unexpected journey that it took to come to these results.
10. **A personal request:** Please don't end with a slide that only says "thank you." I prefer to leave the last slide with the key figures and results. This emphasizes your specific contributions, making you more memorable for your results, and encourages the audience to ask more questions.

PREPARING THE SPEAKING

Now that your slides are prepared, are you ready to speak? This also takes a great deal of training through experience. So the more talks you give, the easier it becomes!

1. **Public speaking is a skill in and of itself.** Be yourself, but work to improve your speaking skills. Some tips to upgrade your speaking are to change your voice inflection and to ask questions to the audience. Raising your voice at some specific points helps to emphasize key results. Asking a question to the audience gives them an opportunity to mentally engage in your specific topic and gives you a welcomed avenue to share your answer.

2. **Practice, practice, practice.** How comfortable are you? If you do not have much experience, it is incredibly important to practice.
    a. On your own: do a first pass of your talk where you allow yourself to feel nervous, have moments where you are unsure what to say, and realize you are missing some key elements. If you struggle with starting at the slides, this may be silly but talk to an audience of objects (e.g. chairs, stuffed animals), so you can practice making "eye contact" and not just staring at the screen.
    b. Record video or audio of yourself: yes it can be scary, but it's the best way to give yourself objective feedback. Think about what you like in other talks. Do you meet your own expectations for what a good talk should be?
    c. Get feedback from others: your research group, or selection of friends who can give constructive feedback. Non-experts are especially helpful because they will have more thoughts on the flow and clarity of your explanations than people very familiar with your topic. First, go through the talk without interruptions and have your guest audience take notes. Then go slide-by-slide hearing their feedback. (This is also why it's useful to number your slides ;) NOTE: When receiving feedback, don't become defensive. It can be hard to accept criticism, but it is how you can become more aware of your blind-spots and grow.
    d. Do the talk without the slides: once you are well rehearsed, try to present your talk without looking at the slides. It could happen that the power doesn't work (which actually happened to a colleague). This also tests your verbal descriptions. By doing something more difficult than the actual event, the real talk becomes easier.
3. **Take care of the practical details.** At the event, well before your session upload your slides onto the computer you will be using. Quickly go through them to make sure everything shows up correctly, animations and transitions are what you expected, and (if you have videos) that videos play. Nothing is worse then giving the presentation and having something not function properly! Are you using your own computer? Make sure if have the right video adapter. Orient yourself to the computer, the location of the audience, and the screen they look at. Is there a microphone you need to speak into? Practice speaking into it. Is there a laser pointer? Make sure it works. Is there a clicker? Notice where the buttons are and make sure it works to advance your slides. Also, make sure to have a backup of your slides on a USB stick or online. Bring yourself some water too!

4. **Know the chair.** Before your session, introduce yourself to the session chair. This is helpful for the chair to know you are present for the talk, and that they can pronounce your name appropriately.
5. **Know yourself and take care of yourself.** If you get nervous, I recommend having at least one friend or familiar face in the audience that you can look to for comfort. If you talk too fast, probably don't have coffee right before (but if it's part of your normal routine then still drink

coffee). Bring water keep your throat clear. An added bonus is that taking a sip of water is a good mini-break during the presentation if you need a break to gather your thoughts.

6. **Be confident.** Remind yourself you are the expert on this topic, and people are there because they want to listen to you and are curious about what you have done. Thrill them!

Acknowledgments: Thanks to the many training courses that I have participated in at Rice University and Brown University, the 100s of TED talks I've watched (especially Simon Sinek), and to the many peers that together have helped refine each other's skills. Special thanks for contributions from Francesco Vischi, Felipe Beltran-Mejia, Ishan Joshipura, and Janelle Clark.

For more practical resources, check out the OSA CAREER CALIBRATOR:
https://www.osa.org/en-us/get_involved/professional_development/career_calibrator

References:

1. S. Sinek, Start With Why: How Great Leaders Inspire Everyone to Take Action (Portfolio, 2009).
2. C. Aruffo, "Turning Scientific Presentations Into Stories," J. Coll. Sci. Teach. 45, 32–35 (2015).
3. J. Akresh-Gonzales, "Spaced Repetition: The Most Effective Way to Learn," https://knowledgeplus.nejm.org/blog/spaced-repetition-the-most-effective-way-to-learn/.
4. N. A. Bradbury, "Attention span during lectures : 8 seconds , 10 minutes , or more ?," Adv. Physiol. Educ. 40, 509–513 (2016).