

Tips for a Successful Scientific Presentation

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Presenting data efficiently is a skill crucial for academic success, but not every scientist is a natural born communicator. In addition, this skill is not formally taught during most residencies or fellowships. As a result, young presenters are at risk for presentations that are both stressful to deliver and ineffective. Practice and exposure to role models help, but early formal exposure to the science of a good delivery might avoid perpetuating mistakes. This descriptive review aims to provide useful tips for new presenters by building in the body of knowledge in data delivery,¹ graphics, visual sciences, and personal observations. It will be divided into content and format. The content section will address the goals and framework of the presentation. The format section will address font and typeface, color, tables, and graphics. We will end with specific differential tips for the platform and poster formats.²

Content

A good presentation engages the audience. The delivery has to be simple, applying the principle that less is more.² This is particularly important when attention is constantly challenged by growing scientific data and technology-based distractions. Data from clicker research studies suggest that the audience's attention must be earned on a continuous basis.³ A successful presentation also requires a clear central message,⁴ supported by a flow of logical ideas that feels like a journey to the audience. The relevance of the central message may be ignored by insecure junior presenters. They might feel that merely dumping data with little interpretation will protect them from criticism. That approach is self-defeating since a scientific presentation is ultimately a form of communication. The audience expects a central message that stems from a reasonable interpretation of the data shown. While everyone may not agree, it should generate discussion and foster networking. A presentation without a central message may prevent dialogue but also leaves the audience unfulfilled. The presenter must prove the existence of a central message by describing it in 25 words or less (aka elevator pitch).⁵ This message is typically enhanced by focusing on the essential data that the audience needs to know, at the expense of data that would be nice to know but is nonessential. This is different than manipulating by omitting essential data that does not support the message. The central message must drive all the sections of the presentation: an attractive title, background (aka introduction

or objectives), methodology, results, and conclusions (aka discussion).¹

The importance of a short and catchy title cannot be overstated.⁶ It will influence the initial acceptance, and select and predispose the audience. It will determine the amount of citations through search engines.⁷ Titles can be categorized into 3 different types⁶: descriptive (eg, a randomized trial of the effectiveness of telestroke), the question-type (can telestroke improve patient outcomes?), or declarative (telestroke improves patient outcomes). The descriptive type discloses the study methodology upfront but can be boring unless the methods are novel. The question-type may exploit the suspense factor, but the reality is most people will only read the title. The declarative type is the best choice to disseminate the central message, even at the risk of ruining the surprise.⁶

After making the appropriate disclosures, the background/introduction/objectives section must briefly address what the study is about by putting the issue in context. The audience should be convinced that they care about it by effectively addressing significance. There should be a sound hypothesis.¹ This section just needs to be long enough to cover these issues, but short enough to keep it interesting (2 slides maximum).

A methodology section should always start by declaring the type of study (eg, case-control). This allows the audience to judge its appropriateness for the study question. It will also help them anticipate the strengths and weakness of that particular design. For example, a case-control study declaration should automatically evoke interest in how the controls were chosen, or how biases were prevented. Not declaring the type of study upfront forces the audience to figure it out by themselves. This extra mental work will be annoying and will make them wonder if the author doesn't know the type of study himself. Another common problem is contamination with results.¹ Just like the background section, the methodology section should be kept quite short, unless the methods themselves are novel or interesting.

The results section should objectively and chronologically state the findings while capitalizing on graphics (see format). A pitfall in this section is to render an interpretation. One can show a $P=0.0001$, but the word significant does not belong here. Conversely, the conclusion section should convey the central message by interpreting one or several relevant findings in the context of previous knowledge. This is by far the

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most interesting part of the presentation. It is also the most challenging to build. Unlike the methods/results, where facts can be described chronologically, a discussion is more vulnerable to disorganization and rambling. This could be prevented by first building a framework of specific points, so the ideas flow nicely. Potential pitfalls include repetition of results, introduction of new findings, and an interpretation that is absent or out of context. Depending on the length, an ending summary and strength and weakness section might be appropriate. In any case, it should not finish with the typical “more research is needed to...” That phrase is clearly unnecessary and leaves a sense of unfulfillment.

Format

Humans are predominantly visual creatures. Presentations must capitalize on images⁴ using a few words to support the speech and use bulleted statements.⁸ Busy texts or graphics should be avoided. In fact, there is never an excuse to say “I know this is busy slide...” The audience would appreciate having it fixed in advance, rather than a preemptive apology. Slides should be limited to a maximum of 6 bullets and 7 words per line, and at least 22 Font (28–40 for headlines).⁸ All capitals or italics should be avoided as it slows reading.⁸ Sans-serifs typefaces (eg, Arial) generally look better in projection, but sans-serif typefaces (eg, Times New Roman) read faster and are more useful for larger texts.⁹ A high contrast-text background is preferred (eg, black text and white background). Text should be spell checked, and different sections separated by title slides. Color should not be used for artistic purposes, but to code and help differentiate variables.¹⁰ Too many colors slow readers, and red and green should be

avoided to adapt to people with color blindness. Similarly, we must resist the temptation to use distracting animations or special effects.

For a small set of variables, tables are best and preferable to pie charts.¹⁰ Tables provide exact values and allow precise comparisons.¹⁰ More complex data sets, however, are better expressed by graphics.¹⁰ The brain prefers graphics with a horizontal trend (longer *x* axis than *y*), flowing from left to right like the horizon.¹⁰ The *x* axis should typically convey cause, and the *y* axis should convey effect. Graphics must be clear, complementary to the text, efficient (low pixel-data ratio), encourage comparisons, have integrity (tell the truth), respect scales, and keep the focus on the data (rather than in artistic abilities).¹⁰ Graphics should also be attractive or eye-catching.

The Figure shows 4 examples of issues with graphics.¹⁰ Image A shows 2 graphical depictions of the exactly same dataset, but clearly, the right one is better. The left one uses too many colors, is unnecessarily 3-dimensional (data is 2-dimensional), and is very inefficient (low data/pixel ratio). Instead, the right one is simpler and uses less pixels.¹⁰ Those solid cylinders became single data points. It also limited the *y* axis to the actual values present, which now serves as a convenient visual depiction of range of data.¹⁰ The rest of the examples are integrity issues, which can be compromised deliberately or inadvertently. For example, B shows a graphic that appears to show an effect but is lacking context. When additional years are shown, it becomes apparent that the variability of the data dampens that apparent effect. Graphic C is an example of manipulating the effect by changing the scale. The *y* axis range is artificially amplifying an effect which is nonexistent

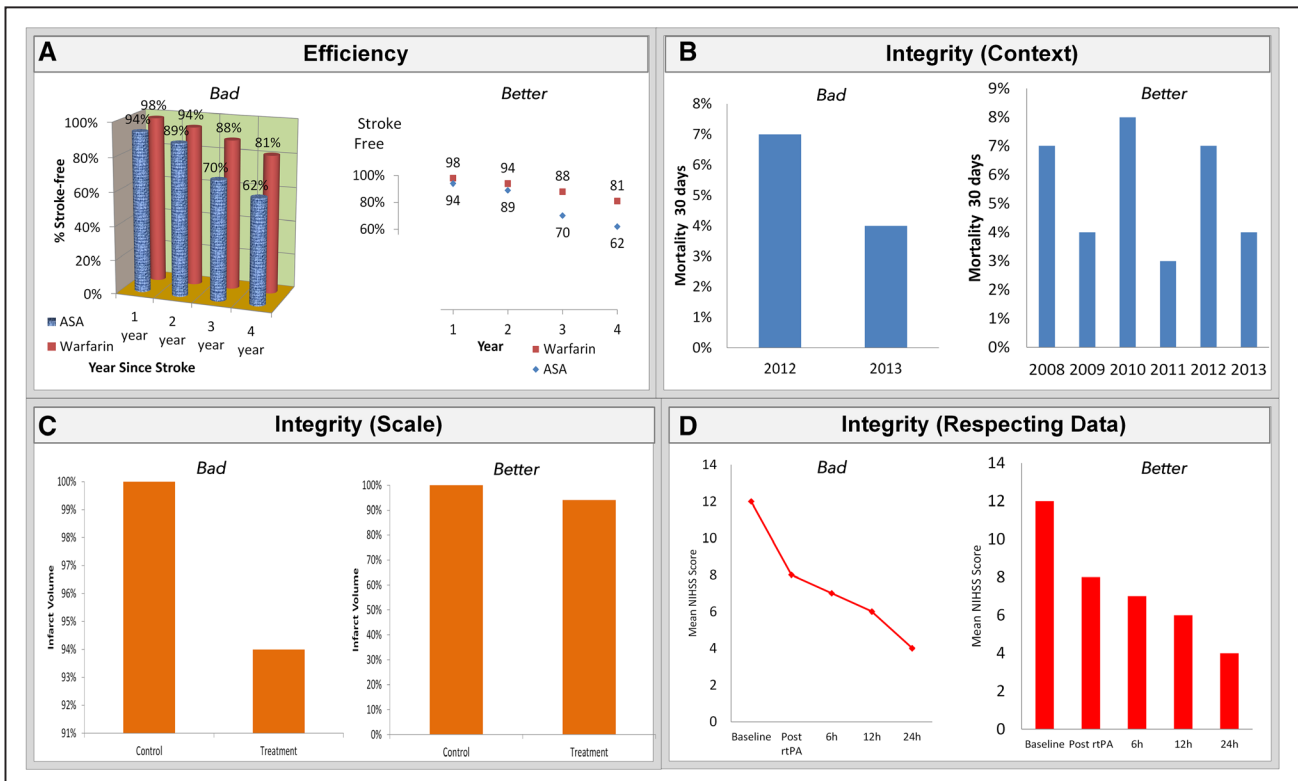


Figure. Examples of issues with graphic efficiency and integrity.¹⁰

when the axis is corrected. Last, D is inappropriately representing discrete data as if it was continuous (straight line), thus confusing the reader.

Specific Tips for Oral Presentations and Posters

Oral platforms are localized in time and space. The audience needs to be understood and engaged as if it was a stage. To prevent stage fright it is advisable to rehearse in advance,¹ get exercise before the presentation, and use biofeedback techniques (smiles and deep breaths). The focus needs to be kept on the presenter, talking spontaneously with the slides as backup support. Presenters should walk confidently, make eye-contact, and appear enthusiastic. They should make it a personal story if possible. They should speak clearly, in a loud but calm voice. Present one slide per minute. Always stay within the allotted time frame. Distracting time-filling sounds (mmmh) should be avoided. Questions should be anticipated through rehearsals and repeated back to the audience. Is important to be humble and ready to admit “I don’t know”, or “did not think of that”. Avoid reading the slides or a scripted text. Do not use a laser pointer (only shows the presenter’s physiological tremor), or change to a defensive tone and body language during questions.

Unlike platforms, posters are fixed in space but spread in time. One cannot control the speed, rhythm, or who reads it at all. Therefore, it is important for poster presenters to capture an audience. Not by showing signs of poster guarding behavior (author’s personal observation): tensely guarding the poster while staring anxiously at bystanders asking if they have questions. Instead, the audience should be given space, and a visually attractive poster should be used for capture. They should have the minimal text needed to understand. The font should be as large as possible, particularly for the title, exceeding the minimal font requirements. Posters need plenty of white space and graphics. Eye tracker data suggest that scanning will start at the title and proceed down and right.

Visitors will focus on the title, introduction, and conclusions, so beefing up those sections is advisable. Institutional logos are visually appealing and should be placed lower right corner to avoid stealing thunder from the title.

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