

Dead Science by PowerPoint

(Scientific Storytelling)

Introduction

Science, like everything else in the 21st century, is heavily subject to marketing. Nowadays, a chemist is not only expected to be good in chemistry, or a mathematician in theorems, but they need to be able to communicate their research in the best possible way for both experts in the field as well as non-experts. A good scientist, traditionally an expert in one field and capable in adjacent fields, needs a deeper insight in a new domain, namely marketing. Selling your research has become nearly as important as the quality of the research itself. For this reason, there are many companies offering advice and guidance for oral presentations these days.

Nowadays, presenting scientific results is much more than just showing data. In conferences packed with speakers, few breaks, and long days, a successful presentation won't be the one with better and more data. It will definitely be the one worth remembering.

But before getting deeper on how to make a presentation worth remembering, the reader must be aware and accept that lecturing is not a difficult art or something inherent to the personality of the presenter. Lecturing is an activity that needs practice, lots of practice.

From now on, I will focus on my field of expertise, chemistry, and in particular data science and synthetic chemistry. However, the same principles apply to other scientific disciplines, such as biology, physics, mathematics, etc.

Preface

Preparing a presentation does not start with a PowerPoint template, but with an evaluation of your audience. It's not the same to present to your fellow chemists working in the same

field as presenting to a wider, knowledge-based audience. This is vital information to consider before preparing the first slides. My recommendation is to get a list of the participants and search their names on LinkedIn. Of course, for larger conferences, or depending on local GDPR laws, this may be practically impossible. However, a quick overview of some of the speakers or possible participants would be advisable.

In second place, comes what, for me, is the most difficult and rewarding part of the process: finding the right story to tell. Yes, you read correctly. To be remembered, one must find a suitable story and be able to correlate your research data with that story. You can base the script on, for example, a historical fact, a famous game, or a movie. All that is needed is to correlate your presentation, or parts of it, to the story you want to tell.

Slide's Planning

So, now we should have our story plus, obviously, the scientific data we want to present. We also know what kind of audience we are going to talk to. Therefore, it's time to start putting together our slides. Consider the slides as a visual aid and not as a list of facts you want to say. Not everything has to be written in the slides or explained. Acknowledge the intelligence of your audience by allowing them to find out what you want to say with a keyword or a particular image.

Figure 1 represents one of my examples comparing open-source databases and commercial ones. Of course, I could have written a list of bullet points below each heading, but instead, I decided to put two pictures related to food.

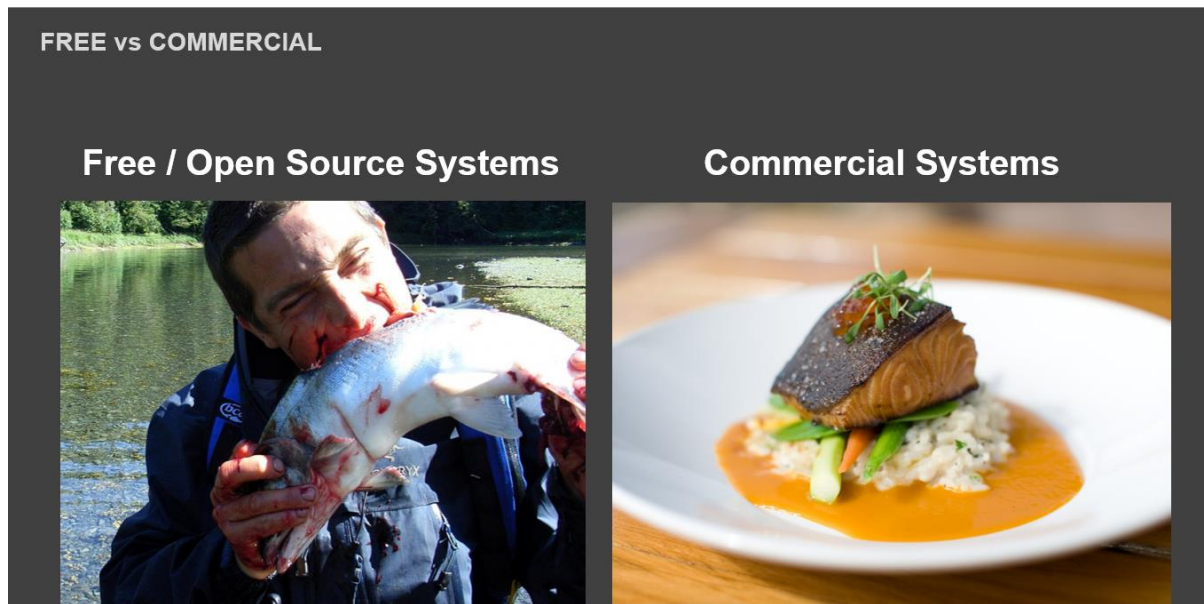


Figure 1.

The whole idea was to find a way to say that “information” (in the slide represented as “fish”) is available in both, open-source, and commercial data bases. Being the main difference how the data (“fish”) is presented to us. Once the metaphor was pointed out, the audience could develop the analogy using their own vision. This approach empowered the message that I wanted to deliver, and it was easy for everyone to remember.

The slides represent not only your company/institution or your own research, but also your personality and respect for the audience. Sloppy and poorly design slides might give the wrong impression to the audience. All details count to let everybody know that you care about them, that you took your time to be likable and put together a presentation worth to remember. Selecting the right color combination and background give your slides an edge. By changing the color/font of few key words, the speaker can control the narrative and the focus of the audience.



Figure 2

The example in Figure 2 shows a way to introduce an open question to the audience. In this particular case, two different points of view about a specific concept (retrosynthetic analysis and organic synthesis) were highlighted in green over a grey background. Later, this open question was rephrased as "retrosynthetic analysis: science or art?"

Arguing open questions (as the one above) in front of an audience, is a very good technique to keep your audience focused on the presentation. The best way to round things up in this type of presentations is with a "punch line" or in a presentation, a final slide to emphasize your message. Here again, a good correlation with a popular story or something of general knowledge would be the optimal situation. In the "science vs art" presentation (Figure 2), after openly arguing the science vs art approach, the final slide referred to Da Vinci, who, as everybody knows was an artist and an inventor (scientist) (Figure 3).



Figure 3

Before getting started with the design tricks for a "worthwhile to remember" presentation, allow me to mention some techniques (or tricks) that will help keep the audience interested. One such trick is to "hide" information within your slides. The point is that text written in almost the same color as the background can stimulate the audience's senses. Some hard-to-see text or images can provoke a treasure-hunting feeling. To me, it has the same effect as a whisper in someone's ear. Figure 4 shows a statement that is almost impossible to see, but it has its effect when the same text is read, and the audience realizes that it is "actually written."

- wider coverage of the NOR
- *in-house* developed *decision selection* tools
- combination of traditional and modern retrosynthetic analysis

➤ 100% success rate in New Route Design more often !!

Figure 4

Transitions between slides can be a hurdle in most presentations, being, in my opinion, one of the most difficult things to get right. Obviously, sometimes it's not possible to have a smooth and fluent transition between two different topics within the same presentation. However, a trick that works to smooth the process is to not rush the slide change and start talking about what is coming next before switching to the next slide.

A very uncomfortable situation when presenting happens when one loses track of what is coming next. The most elegant way forward is to look at the audience and just ask them things such as "How are you doing?", "Still following me?", or whatever you want to ask as long as that gives you time to check what the next slide is about. Again, this technique will not come naturally, so, the more rehearsal the better one can use these tricks.

Use looping during a presentation to send out a clear message. By looping, I mean referring in one way or another, for example, via repetition, to a specific slide. This trick is particularly useful when talking to a more general audience, not a hundred percent experts in your domain. In these situations, I personally like to refer to popular films. In Figure 5, an example of looping is shown. During a conference oriented to a broad life science community (not only chemists), I wanted to emphasize that there are new ways to perform a specific

chemical task (finding new synthetic routes for new molecules). Since I was not sure that my audience was going to understand the concept of “Route Scouting” and the new trends in performing this task, I decided to link the concept to a famous film, “Matrix: Revolutions”. I used the same concept up to 3 times in the first 19 slides, and by the end of the conference, everybody could remember the movie and with that my message.

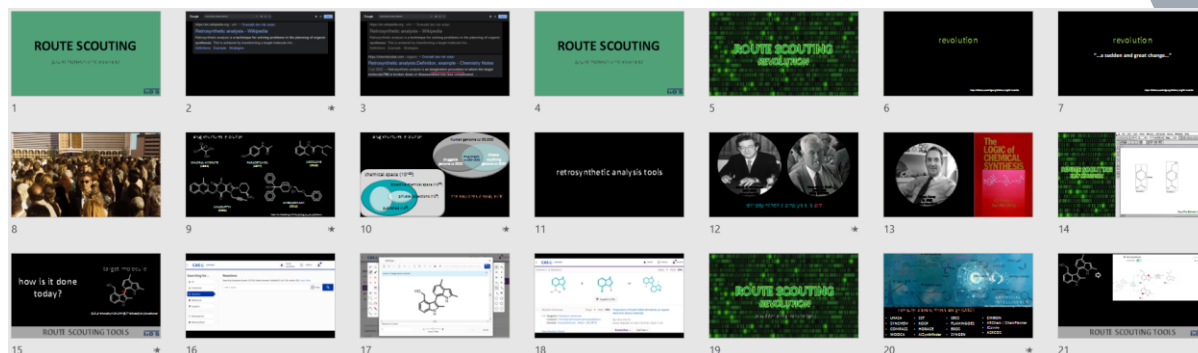


Figure 5

The selection of the background and font colors would, definitely be the most personal choice of all. Generally, in big conference halls with rather big screens, dark colors are recommended so that the room, often having dimmed lights during presentations, is not flashed with a massive white slide. However, sometimes we are required to use corporate templates even when they are not the most suitable ones for conferences.

Next, a practical example and basic rules for the slide design (chemistry oriented).

DEAD SCIENCE BY POWERPOINT

This presentation is not about what is right versus what is wrong, neither a “SOP” for presentations, honestly, this text was put together to avoid this:

WHAT IS THIS ABOUT?



Exactly. For a speaker there is nothing more discouraging than to look at the audience and see this picture.

This slide brings up the first point. Even when the message is quite simple, the picture is not strong enough, there are elements of distraction, the white spaces, the logo, etc.

WHAT IS THIS ABOUT?



Figure 6

Much better when the picture takes the whole screen or as much as the resolution of the picture allows, then a moving object (the X) in sharp color will emphasize the message.

Presentation Design – Basic Rules

Some of the basic rules to start preparing a presentation have been mentioned before, but it's important to remember them.

PPT-PRESENTATION BASIC RULES (I)

1. Who is listening?
2. Where will they be listening?
3. What do you want them to remember?



Who, Where and What are all the key words we need to indicate:

PPT-PRESENTATION BASIC RULES (I)

- Who
- Where
- What



To know your audience, the type of presentation (in a venue, conference room, digital, etc...) and what is the story you want them to remember are the basics.

In a second set of basic rules, we can encompass the slide's design rules:

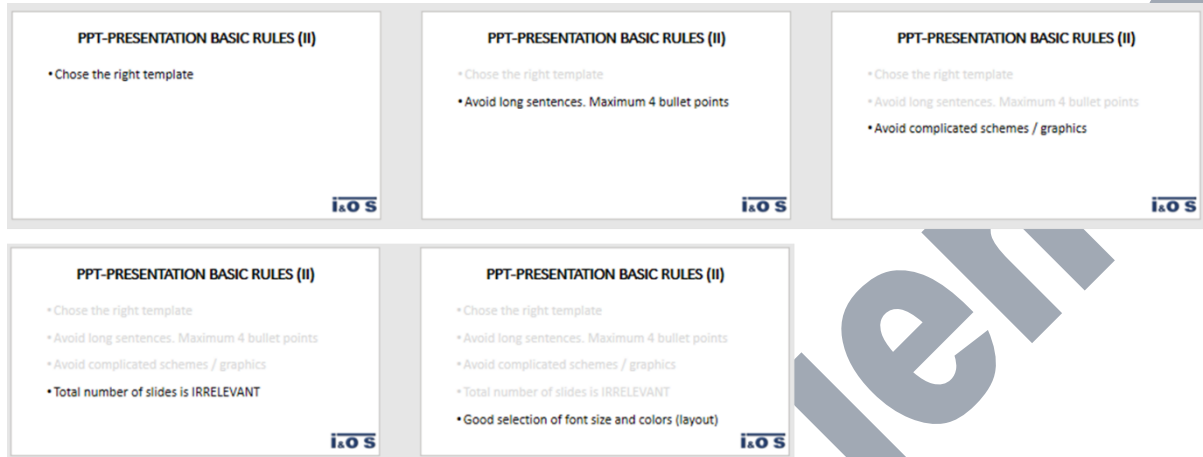
PPT-PRESENTATION BASIC RULES (II)

- Chose the right template
- Avoid long sentences. Maximum 4 bullet points
- Avoid complicated schemes / graphics
- Total number of slides is IRRELEVANT
- Good selection of font size and colors (layout)



Though the slide suggests 4 bullet points and contains 5, the most important flaw to discuss is not that. While presenting a slide like the one above, the speaker could be talking about

the second bullet point and the audience is reading the fifth. It's important that the audience concentrates in what the speaker is saying, and the way to control that, is by putting the information in such a way that the speaker controls where everyone is looking. In a live situation, the above slide would be split in five different slides:



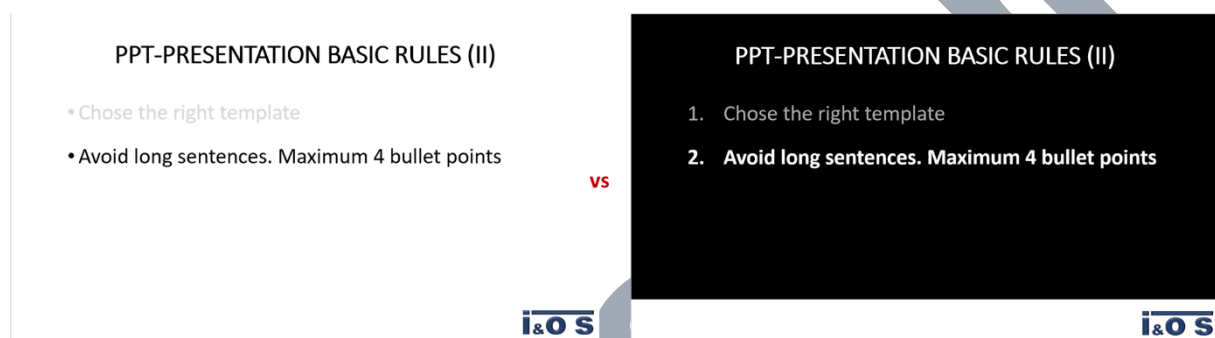
Revising the slides above, it is obvious that the first bullet point is not being considered. Although black text over white background is the traditional way, it's not easy to control where the audience is looking at, with so much brightness. Much nicer to combine dark background with clear text, see below:

PPT-PRESENTATION BASIC RULES (II)

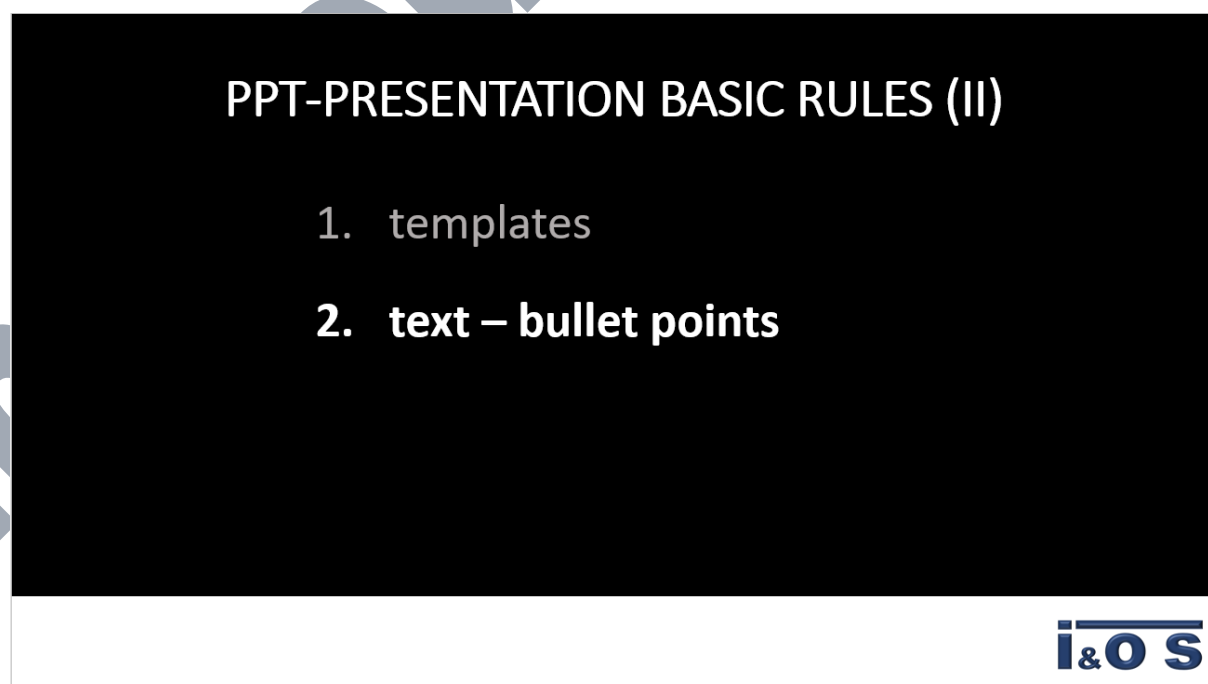
1. Chose the right template
2. **Avoid long sentences. Maximum 4 bullet points**

While keeping corporate templates with white backgrounds, we can add a black square and write the text on top of it.

Looking back at the slide above, there are two things to highlight. The first one is that if you want your audience to remember a list of bullet points, the best way is to enumerate them. Don't use icons or bullet points, use numbers, and refer to them as much as possible, so everyone knows that you are talking about 5 points. Or do as I just did in this presentation, I refer to 4 bullet points but my slide has 5, all these tricks help you to get the message through.



However, the previous slide does not “avoid long sentences”. The less the audience must read the more they will listen to the speaker. For that, the previous slide can be simplified to:

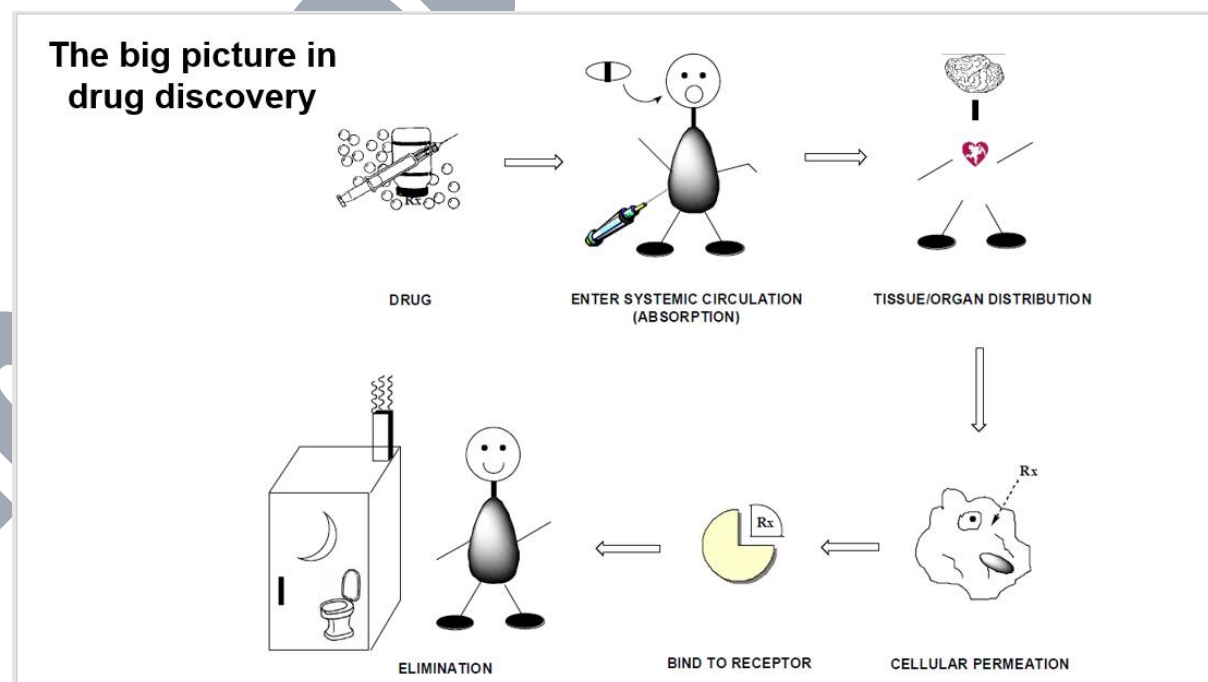


The next basic rule is:

PPT-PRESENTATION BASIC RULES (II)

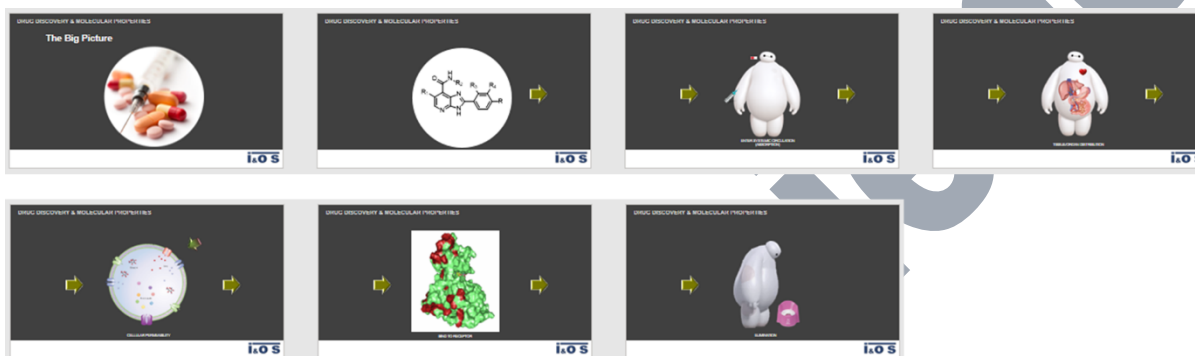
1. templates
2. text – bullet points
3. schemes and graphics

As rule of thumb, avoid complex schemes or graphics, but if one must, use a sequence of slides instead of a busy slide. Of course, you could use a single slide with animations, but this makes editing tedious at some point and in the worst case you might not be able to present in PowerPoint's presentation mode, or have to use a PDF, hence splitting up animations over multiple pages is very advisable. Look at the example below:



Although in terms of elements, the slide above is not the worst I have seen, the amount of information that represents is quite complex. The picture represents the pharmacokinetics of a drug in the human body. By taking time preparing a sequence of slides for each step, it is ensured that the speaker can expand the information of any of the steps without worrying that the audience is going to look at another step. And as said before, your attention to detail and effort putting together the presentation it will be acknowledge with attention.

The slide above was presented as a sequence of seven slides as follow:



Following the basic rules for a slide design, next it comes: Number of Slides

PPT-PRESENTATION BASIC RULES (II)

1. templates
2. text – bullet points
3. schemes and graphics
- 4. number of slides**

The best one can do when preparing a presentation is to ignore the number of slides.

Actually, one scientific factor to consider when presenting, is that the human brain has a

visual processing speed of 13 milliseconds. As it sounds, our brain can process an image in only 13 milliseconds. No more, needs to be said, number of slides? Irrelevant.

Last one of the basic design rules is probably, the more difficult to be defined, “font size and colors”.

PPT-PRESENTATION BASIC RULES (II)

1. templates
2. text – bullet points
3. schemes and graphics
4. number of slides
- 5. font size and colors**

It is obvious that the font size should be big enough for everyone to see it, but it depends on various factors such as the screen size, conference hall size, etc. The most common suggestion on the internet is to use a minimum font size equal to the age of the oldest person attending your lecture divided by 2. However, it is better to go bigger than this and be consistent with the font size throughout the presentation.

When it comes to colors, there is not much to say except to check the contrast of your choice with the background color and other items on your slides.

Tables, in general, do not work well with PowerPoint presentations. Therefore, it is advised to avoid using them or to present the data in a graph or chart instead.

DATA TABLES PRESENTED BY PPT**DON'T**

BUT IF YOU MUST TO...

i&O S

But if as stated in the slide you must to, here are few tips:

DATA TABLES PRESENTED BY PPT

- 1. Avoid numbers**
- 2. Avoid more than 3 digits**
- 3. Avoid more than 5 entries**
- 4. Use very big font sizes & colors**

BUT IF YOU MUST TO...

i&O S

How to avoid numbers on a table? Well, the point is to avoid table cells that are too close to each other and filled with five-digit numbers. It can be very confusing and difficult to follow. Another common situation in chemistry-related presentations is detailed discussions about the total synthesis of a molecule. Here, the same advice applies as with the tables:

TOTAL SYNTHESIS PRESENTED BY PPT

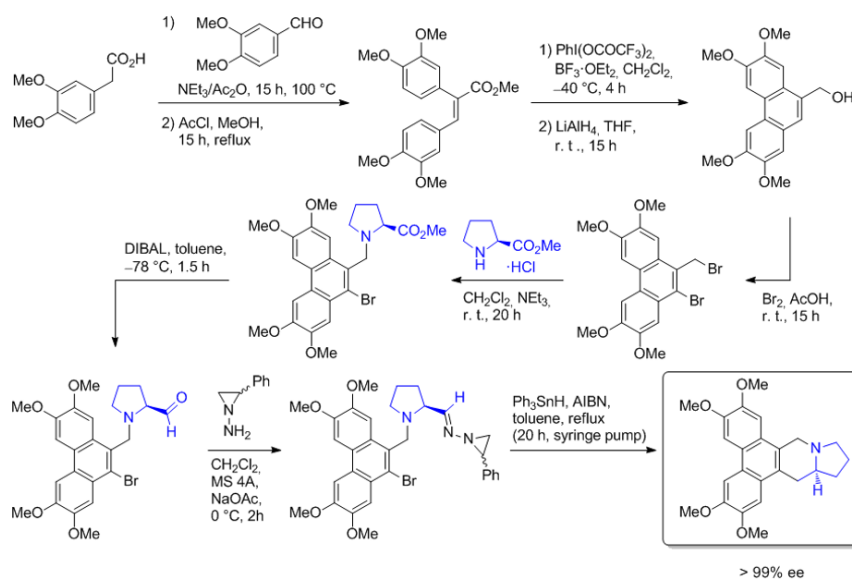
DON'T

BUT IF YOU MUST TO...

i&O S

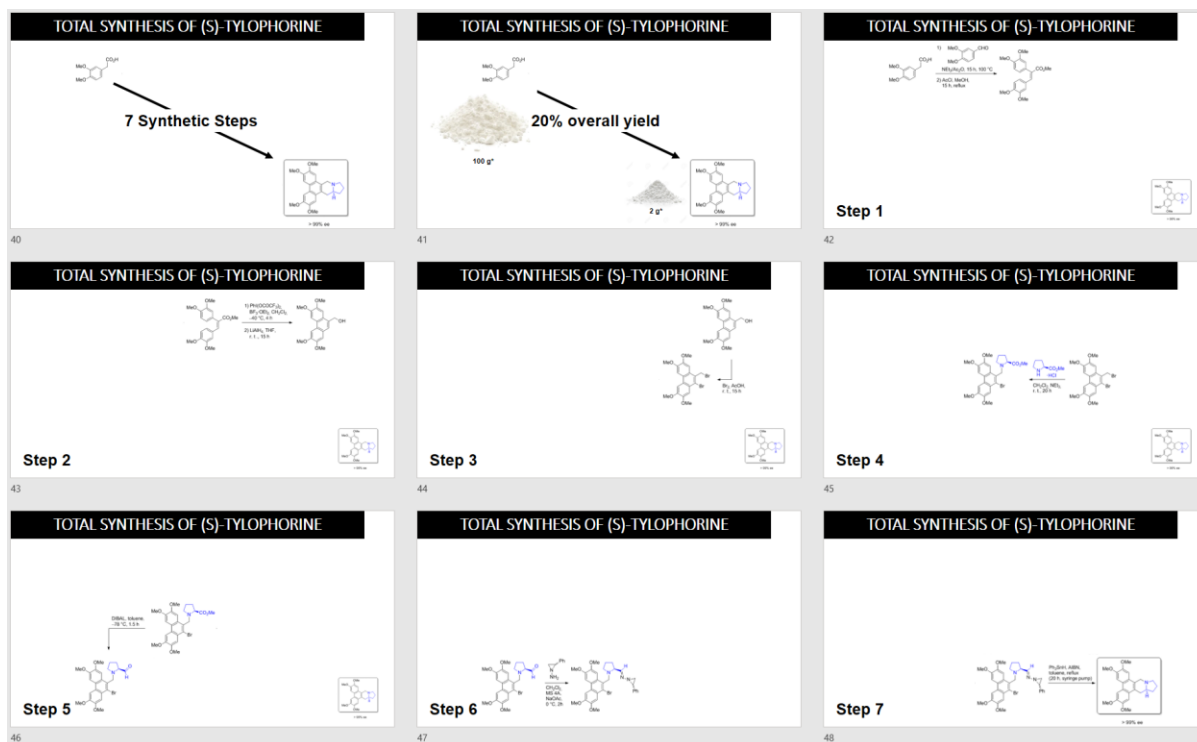
But, should your presentation be solely focused on the synthesis, I would discourage you to use slides like this one:

TOTAL SYNTHESIS OF (S)-TYLOPHORINE



The best possible way is to show one step at the time and try to use the imagination to spice it up.

The sequence below represents an example of what it could be done if one must present the total synthesis shown in the slide above:



The pertinent notes in this type of presentation are, first, avoid it as much as possible, secondly, redraw all structures so you can use a dark background color. Third, coloring the new bonds after each synthetic step also helps.

Last but not least:

LAST BUT NOT LEAST

1. Take your **time**
2. Check color **contrast**
3. Be **consistent**
4. **Rehearse**

Figure 7

Presenting at conferences can be quite stressful and generate a certain level of anxiety. Thankfully, the timelines for conferences are usually quite generous, so you have enough

time to plan and think about everything we have been discussing here. Do not waste your time and start thinking about your story as soon as you know you are one of the speakers. As another piece of advice, think of at least two possible stories to tell. Once you are designing your slides and mentally rehearsing, you will realize which of the two works better.

Color selection can be extremely difficult. Not only do colors on your computer screen look different on the conference screen, but the contrast between the different colors used is also important. There is no general rule for selecting the combination of colors, but as we have seen in some of the slides presented here, an intense red X can represent a "strong" message (Figure 6). However, it is not good to overuse highly intense colors in slides just because we want to emphasize or highlight something. At the end, the viewer can get used to it and lose interest.

Since not everyone likes the same colors, it is not relevant to suggest this or that color. However, what I strongly recommend is to check if the selected colors have enough contrast. There are many websites that can help you with that, but <https://webaim.org/resources/contrastchecker/> is a popular and easy-to-use site.

Be consistent with the colors you use, the font and font size, and in general, with your slide layout.

Rehearsal is key to success. Each person has their own method, and for me, I like to print out handouts and write down the important things I have to say on each slide (just writing a list of keywords is enough for me). Then, I practice saying the same things in different ways and work on transitions between slides. Rehearsals are also useful for determining the order of the slides, checking the colors and font size, and more.

*no preaching, no teaching, just a
perspective and an opinion*