

Speaking Science Seminar

Part I – Telling the story of your research

This seminar focuses on speaking skills, particularly in communicating scientific research. The aim is to provide tools to practise in future presentations and to help you find a presentation style that you are comfortable with. These notes cover what we discussed in the seminar and can serve as a reference for your future science communication journey.

1. The most important lessons

- There's no 'secret' to public speaking: here are some simple tools and practise will help you find a style that works for you

2. Tell us a story!

- In traditional cultures around the world, knowledge has been passed on through stories, fictional and factual, over an evolutionary timescale – so our brains are hard-wired to engage with them.
- Stories are still all around us, yet we often avoid them in science, because we want to be as objective as possible
- But the process of doing science to answer questions or address a challenge can lend itself storytelling – you can probably think of scientists who have gone to particularly impressive lengths or faced huge obstacles to make their discoveries (like the example of Barry Marshall).
- What does the story of your research look like? What obstacles did you have to overcome, what did you learn?
- Using the tools of storytelling can make your science more engaging and easy to remember: for your audience and for you
- You can make your whole presentation into one story, without compromising scientific accuracy. A good structure might be:
 - Starting with a problem and showing people why it is important
 - Describing how you are working to deal with this problem, in a way that is human and relatable
 - Ending with the impact that your work is having on the problem
- Before starting to write, you want to consider three questions:
 - What is the aim of your presentation?
 - Why are you, the one to give it?
 - Who is your audience?

3. What is the aim of a scientific presentation?

- It might be: to give people tools/knowledge they can use
- To get people's input and advice
- To find collaborators or people who can help you, or take your work forward
- To get funding
- Knowing the aim of the talk will help you tell your story.
- A talk is different from a paper
 - A paper requires all the scientific detail necessary to reproduce the work. It has a very rigid structure: Abstract, introduction, methods, results, discussion – but people can read it in any order.
 - In a talk, people listen in real time. They can't digest the same level of detail, so you don't need to include it. If they're interested in your work and want to know more, they can always ask you.
 - You have a lot more freedom to define the ideas you want to bring across; to structure your talk; and to lead people through the story. Use that freedom!

4. Why are you the one to give it?

- As a scientist, you find answers to questions that nobody could answer before.
 - On some specific topic you know more than anyone else in the room – or anywhere else. This is why people have come to listen to you.
 - So what is it that only you can tell?
 - What way of telling it suits *you* best?
 - Your authority is assumed: you don't need to prove it.
- But you also have authority in another sense. You are the author of your story:
 - you decide how to tell it. This can mean leaving out details that aren't relevant to the presentation. You are committed to scientific accuracy, not to completeness.
 - Of course you can't leave out information that alters the interpretation of your results! It is up to you to tell your story with scientific honesty.
 - You can sometimes come back to details missed out during the Q&A

5. Who is your audience?

- What do they know already? Are they specialists in your subject? Scientists with different expertise? Students? Funders? Non-scientists with a general interest? Ask your supervisors if you are not sure.
- Vary the level of detail depending on the level of expertise of the audience.
- Far more science presentations have too much detail than too little!
 - Details are crucial as a scientist, but you need to step back to give a presentation. Too much detail can be overwhelming.
 - People can ask for more detail, but only if they know why it matters

6. Framing the problem: How to start

- Your audience forms an opinion of you in just a few seconds: make them count!
- You don't need to start: "Hello, my name is ____ from ____ university and I am here to present my talk titled....". Someone will normally already have introduced you or people have a programme sheet.
- Start your story straight away, with something unexpected.
- What is the problem you are working on? Why does it matter to the real world? Who does it affect? Give people a reason to care about your work.
- One way to start: a short story or anecdote
 - Anecdotes can make a bigger issue more intuitive. They often resonate with people far more than statistics, and are what people remember – ideal to illustrate your problem or solution. People remember the characters: you can bring them up again later.
 - An anecdote can be about someone you know; the moment you realised something; or to show the magnitude of a problem. The best anecdotes are those where you have a personal connection.
 - They can contain a lot of important information
 - You CAN alter details or merge two stories – what matters is the message of the anecdote.
 - Anecdotes are powerful but can be used to misrepresent the truth. You are the expert: Does the anecdote represent the real issue?
- Or: start with a key moment when you realised something
 - Start where the story is most interesting: a pressing problem, or the moment you realised something important.
 - You don't have to tell things in chronological order: tell them in the way that makes most sense.
- Don't lose people at the end of your introduction. Once you have stated the problem, carry on to what needed to be done. At the end of your introduction people need to know what you are doing and why.

7. Leading your audience through the scientific content

- The curve of detail over time
 - Many presentations have a good introduction but then get technical too quickly – it's easy to lose people here.
 - The scientific approach you take should follow clearly from the introduction
 - Over the course of the talk, mention again why what you are doing is relevant. This allows people to catch up
 - At the end, bring the level of detail back down
- Tell your experience, not just the result
 - Don't be afraid to communicate emotions. Showing how you felt at different stages of your work – what you're excited or worried about - will help you connect with your audience.
 - Your failures can be the most powerful part of your talk. Show your frustration, but turn it into something positive. What made you push on? Did you get any great advice? What did you learn?
 - People empathise more if you succeed after failing at first than if you succeed straight away

8. Your presence on the stage

- You are the expert and you have something to say that is worth listening to. But sometimes it doesn't feel like that on stage!
- Projecting confidence gives you confidence. Speak loudly and slowly, varying volume and speed.
- Use pauses deliberately, to separate thoughts and for emphasis.
- Keep as much eye contact as possible. Try focusing on one person for each idea, but don't worry about looking at everyone in turn.
- Project the emotions that you want the audience to feel: Be excited about what you want them to be excited about
- Stand and move with purpose
 - Keep both feet on the ground, slightly apart and don't lean on anything. If you have to click through your slides, stand next to your computer, not behind it
 - For practice: try standing with your hands at your sides while talking, it feels weird! But use gestures to reinforce, not to keep your hands busy.
 - You can move around the stage for emphasis or to show that you are moving on to a different topic

9. The art of presentation is changing

- Virtual presentations are here to stay
- Virtual talks are usually still live – but getting feedback from your audience is extremely hard. This will change how we present in ways we don't yet know
- Work out how the medium of your presentation will affect what your audience takes away from it.

10. Ending well

- Refer back to the problem that you set up at the start. Did you solve it? Do you understand it better? Will others build on your work to solve it?
- Look into the future: think about how your results could be applied.
- Whenever possible, end on a positive note.

11. Responding to questions

- Questions can seem scary, but a room full of scientists engaging with your talk gives you an opportunity to learn and gain useful advice.
- Leave a few minutes at the end for Q&A, and try not to cut this short
- If you get a question in the middle of your talk, acknowledge it, finish your current thought, then answer it, if you can do so quickly, or say you'll answer at the end.
- Asking a question takes courage. Be grateful for the contribution and try to thank each person differently, to avoid sounding repetitive or insincere.

- Sometimes you will get a hostile question. Take the question seriously, but ignore the tone. Can you treat it like a helpful suggestion? Try not to get defensive!
- If the question is difficult, take a moment to think or ask for clarification.
- Keep your answers to the point: don't try to draw in lots of things you couldn't fit into the main talk
- If you know what was asked is an open scientific question, you can show some excitement about more research to be done
- If you really don't know the answer, say so!
- Zoom-in and zoom-out questions
 - Zoom-in questions are about what you said, asking for clarification or more detail. Answer these briefly. If there's been a misunderstanding, you can learn what you need to clarify next time
 - Zoom-out questions are about what you didn't say, asking you whether you had considered another angle or if your work can be extended. These are the questions you want to invest in
 - Have you done the experiment they were asking about, but did not have time to talk about it? Now is your chance to bring it up.
 - Had you thought about what was suggested but did not do it? Explain why, but keep your answer brief.
 - Did the question bring up something you had not considered? Be excited! If it helps you to improve your research then everybody wins. Don't feel bad– this is the purpose of scientific discussion.
- Some questions start great discussions, but the Q&A may not be the best time. Offer to discuss further later rather than taking up the whole session.
- A great example of a Q&A is at the end of this lecture by Prof Rattan Lal: <https://nisd.ac.uk/event/world-food-prize-winner-rattan-lal-speaks-to-nisd/>. By keeping to the point, Prof Lal gets through lots of interesting questions adding great insights.

12. Practise

- A talk is a performance: invest time in practising delivery as well as writing content. Aim for three complete run-throughs
- Practise alone, then with a friend or colleague, or even in a mirror. Find a space to give your talk fluently, loudly and confidently. If possible, give the talk in an empty seminar room with all the technology you'll be using.
- Go back and change things if necessary, then practise again
- Try even filming yourself - your phone will do! You may well notice subconscious mannerisms like swaying or fiddling with your hands.
- Try just introducing one or two new tools with each new talk
- Find good people to learn from
 - The internet is full of advice on how to give great talks, though applying this to communicate science takes creativity
 - TED-Talks online can give you a lot of ideas
- Example TED-Talks, see what you like and what you don't:
- A wonderful talk by Benjamin Zander (<https://www.youtube.com/watch?v=r9LCwI5iErE>) notice who he actually doesn't move purposefully and seems a bit on edge, but because he has a style he is comfortable with, he can speak freely and all his enthusiasm comes across
- For a much more polished style of speaking, you can look at Simon Sinek's talk (e.g. <https://www.youtube.com/watch?v=4VdO7LuoBzM>) what suits you better?
- Not all TED-talks are good: reading from his notes all the time, insecure standing behind the podium, somewhat self-aggrandizing and retelling history rather than a story, without making the big issue clear: Michael Gosney: <https://www.youtube.com/watch?v=sfPggRXo3gs>
- An example of getting the start right by not starting at the beginning - compare Abby Sutherland's talk at Conejo (<https://www.youtube.com/watch?v=0amtzgsSbxo>) with the one she gave at Waterloo (<https://www.youtube.com/watch?v=GMSNAbl1l6I>) Were you waiting for the rogue wave?

Part II – Slides to make your talk more engaging

This part is more technical and focuses on the use of Powerpoint to create slides that usefully support your talk. Most of this can also be applied to any other software that you might prefer. We cover how to use text and images well and various ways that you can help your audience in following your talk. We also cover the use of technical aides and the presenter view and how to deal with things going wrong - technical or otherwise.

Slides are there to support your talk

1. Start by planning your story, then design the slides to help tell it
2. Your slides are for your audience: face your listeners, not your slides!
3. Keep slides clear and simple

Keeping your slides simple

1. Slides cost nothing, you can have as many as you want!

- Only put the information on it that you want people to consider while you are talking
- Put pieces of information that you want people to connect on the same slide
- You can build slides progressively using simple animations (appear or fade)
- There's no need to follow a rule like '1 minute 1 slide'.
- If you feel you need to point at things, your slides are probably not clear enough!
- Empty space is fine, as long as the slide is balanced
- But sometimes the edges get lost by the projector, so don't put anything important at the edges of the slide

2. Be careful when reusing old slides – do they fit into the new story?

- In practise, you won't have time to design slides from scratch with each new talk
- But watch out: don't let the slides dictate the story!
- Remember the three questions from the last session: What is the aim of your talk, why are you the right person to give it and who is your audience?
- Is the story you told last time still appropriate?
- What can you improve, what needs to be different for this audience?
- Some old slides will fit right in, some will need changing, others won't fit this time
- Save each version of your talk, so you'll have more to draw on later

3. Only write what you want people to read

- While people read, they might miss what you say
 - Only write important things that you want people to remember or write down, keep writing as short as possible
 - If you need bullet points, you have got too much text: split the slide up
 - If you are talking in a language the audience is not very confident in, you can use a little more writing to help them catch what you say
- Be consistent with fonts
 - Only use one or two in your slides
 - Non-serif fonts are easier to read (but opinions differ)
 - All-capital text is hard to read (and looks really angry)
 - Don't go smaller than font size 18 – around 24-32 are good for normal text

4. You have three routes for information

- what you say, what you write and what you show
- The best way to make an important point is by using all three at the same time
- Show a picture/graphic, with a few words on the topic, while you explain it.

Slides and slide elements have different purposes

5. Your title slide introduces you

- Very little writing is actually needed
 - Only your title and your name are essential
 - You could include: your home institution, your lab
 - If it's on the slide you don't need to say it, you can start your story right away
 - But leave your title slide up for a few seconds in case people want to write down your title and your name
- Get a catchy title
 - At conferences, people decide which talks to go to based on their titles
 - Target a wide audience, the specialists are coming anyway
 - Avoid gene names or uncommon acronyms – a big turn-off for non-specialists
 - Make it short – ideally your title should fit in one line
 - Focus on what you are trying to achieve, rather than your method,
 - e.g. use “A viral diversity database to fight Maize Lethal Necrosis” rather than “Using Next Generation Sequencing to assess the diversity of MCMV and associated viruses in Mozambique”

6. Illustrating a story: images

- Images and graphics can make things more intuitive
- What point does an image help you to make? Don't just use them to fill empty space
- Never crush/distort images if they don't fit. Instead, crop them or rearrange
- A whole slide filled by an image is a good backdrop for an anecdote

7. Going into detail: diagrams

- Break down complicated plots
 - build your slide sequentially or put pieces on different slides
 - keep figure captions to a minimum, you are there to explain
- Keep colours consistent
 - Use ingrained associations with certain colours to your advantage
 - If you have taken the plot from someone else, consider re-writing the axis labels, numbering and legend or even redrawing it for the slides
- Remember some people are colour-blind/weak
 - Difficulty distinguishing red and green is most common and affects about 5% of men (and very few women). Avoid relying on red/green contrasts.
 - If you want to make sure your slides are readable for colour-blind people, there are online tools that simulate different kinds of colour-blindness
- Colours carry associations
 - Red/orange draw attention, green/blue are calming and positive
 - Keep the association between colours and what you use to represent with them consistent across all slides

8. Helping people keep track

- Remember the curve of detail: allow people to catch up
 - Your slides can make it clear what level of detail you are talking on
 - Diagrams and data indicate detail, simple slides (like a full slide picture or single line of text) show general information
 - Move between levels of detail to link scientific results back to the overall story
- An option: Interruption slides
 - You can deliberately interrupt your slides to indicate a partial summary or the start of a new thought
 - A single line of text on a slide shows “this is important”
- Or: A home slide
 - A slide that appears several times can help people to put your story together
 - It can include more text, as people will only read it bit by bit
 - Make it clear where you are in the progression by emphasising the bit that you're talking about now, by highlighting different parts or using animations.
 - You can put the home slide at the start and end of each section of your talk

- Use meaningful titles for each section and your home slide also serves as a summary
- Titles should be useful statements
 - You can package important information into the titles of slides. E.g., instead of “Measuring expression of YFG in different tissues”, “YFG is expressed in flowers and pods”
 - Even if someone gets lost, they get the main point of the slide from the title
 - This is useful when writing papers or posters as well, as it allows your readers to get the main message from skim-reading
 - Keep titles short – always try to only use one line
 - Not all slides need a title

9. You have to have an acknowledgements slide

- The best way to thank people is to mention them during your talk itself
- Point out the most important people, but you can put up many more names than you say
- A group photo is a nice way of thanking a larger group
- Only thank funding bodies in words if you know they are listening, but always put up all their logos

Using technology in ways that are helpful

10. AI design tools

- These are developing rapidly, so keep an eye out and find what is helpful to you
 - never let them dictate how you tell your story
 - Be careful with generated images. Are they accurate representations?
- Remember that you have authority – that also makes you responsible for everything in your talk

11. Backgrounds and designs

- Powerpoint has lots of standard designs: these are not all helpful
 - Only use the simplest ones with few additional elements
 - The Designer feature is useful!
- Dark and light backgrounds
 - Contrast between the background and the text or images is important
 - Dark-on-light keeps people awake: good for diagrams
 - Light-on-dark makes text stand out better
 - Some photos (esp. micrographs) work better on light, some on dark background
 - Frequent switching of backgrounds can be disorienting
- Don't include additional elements on every slide
 - Your institution logo only needs to be in the acknowledgements, unless they insist put it everywhere
 - You don't need to keep putting date, venue, title, your name etc.
 - Slide numbers can help people refer back during the Q&A session. If you want to use them, make sure they are large enough to be read
- Keep animations and transitions minimal
 - “Appear” and “fade” are nice for adding or removing items step by step
 - Other animations can look a bit silly and distracting
 - If it's too complex, it's more likely to go wrong! Click through your slideshow, not just the editing mode to check everything

12. Technical tricks can help or hinder

- Powerpoint's presenter view shows different output on the computer to the projector
 - If you need notes, use the notes section, not the text on the slide itself
 - Make sure that the notes are big enough for you to read and fit on the screen
 - It helps you keep an eye on the time
 - You can also see the next slide or animation step
- Using a wireless presenter
 - This is a small device for clicking through your slides

- It allows you to step away from the computer, but click through the slides yourself, rather than having someone else do it
 - Essential if you want to speak freely, use anchoring and always keep audience contact, but you need to be confident without notes
- Do you really need a laser pointer/pointing stick?
 - If you need to point to something on the slide, see if you can simplify it, e.g. by only displaying what you want to talk about, building your slide sequentially, using highlighting, zoom in, displaying an arrow etc.
 - This looks more prepared and everyone can see it
- Sound can be tricky: only use it if absolutely necessary
 - Laptop speakers aren't powerful enough to fill a big room
 - You'll need to check if the room has a sound system and how to connect to it
 - Try it out beforehand and check if the sound is clear at the back
- Videos can be nice, but they can interrupt the flow of your talk
 - Anything moving attracts attention away from you
 - Only talk about what is shown in the video while it is actually playing.
 - Only use videos with sound if you could not say the same things just as well
 - If you include a video, think of a way of getting the message across if the video doesn't work, so you are not stumped, don't spend a lot of time getting the video to play
- Try your technology
 - Things sometimes work on your laptop screen but not on the projector
 - Make sure the cables fit, especially if you use a Mac
 - Be prepared: have your talk on your computer, but also on a USB-stick, or send it to yourself by email/Dropbox

13. Sometimes things will go wrong

- What went wrong in talks you gave in the past? What are you worried might go wrong? Practise these things specifically
- Keep to time
 - Measure how long it takes in your practise sessions
 - Do you talk faster or slower/more when under stress? Take this into account
 - Define 2 or 3 checkpoints: where in your talk do you need to be at what time?
 - Use presenter view, a clock at the back of the room or on a table, or even your phone out on the table to keep an eye on the time during the talk
 - This way, you'll realise if you are behind early on, so you can speed up a bit, rather than cutting out a chunk at the end
 - If all else fails and you have to cut short, skip slides from your detailed work and go directly to your summary
 - Give the end of your story: how your work affects the issue
 - Offer to talk to anyone who is interested later on
- If you get interrupted
 - Zoom-in questions you can answer straight away, more complicated ones you can refer them to the Q&A
 - If they ask about something you discuss later in your talk, say you're coming to that. Don't change the order of your talk on the spot
- If technology fails, you can always fall back on your overarching story
 - It's better to give your talk without technology than to not be able to give the rest of the story
 - You can leave out some detail, just focus on the main results and what they mean for the problem you are working on
 - Audiences are more forgiving than yourself – everybody knows what it is like when your technology fails

To help you go deeper

- Susan McConnell (Stanford) does a nice job on much of what I have said, but with a focus on slide setup <https://www.youtube.com/watch?v=Hp7Id3Yb9XQ>
- There are countless videos on Youtube and elsewhere on the internet. Look around!
- People will tell you different things, so experiment and find what works best for you