TIRED OF

UNINSPIRING

SCIENTIFIC

PRESENTATIONS?

11 - 15 DEZ 2017

EFFECTIVE

COMMUNICATION

SKILLS FOR SCIENTISTS
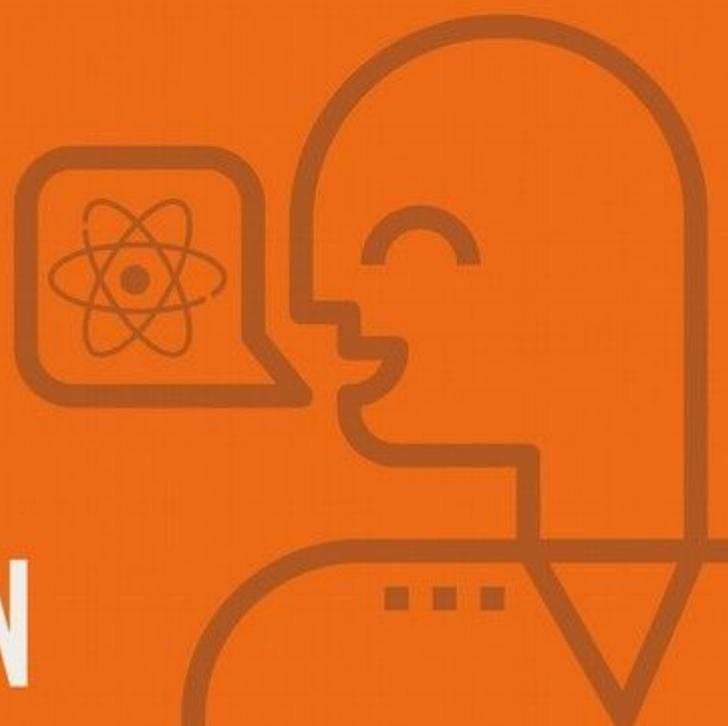
Ministrantes: Dr. Francesc Montserrat (IO-USP, Lab. Manejo);
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(Univ. Cádiz, Espanha), Dr. Vanessa González (Ilustradora científica).

USP
Universidade de São Paulo

Effective Communication Skills for Scientists

Workload in hours

Preparation: 5

Theory: 16

Practicals: 12-16

Homework: 4-8

Conference (examination): 6

Total: 40 (1 full-time work week)

Period

Third trimester (11-15 December 2017)

Student places

minimum 10
maximum 30

Introduction

Presentations, posters and articles are the opportunity to broadcast your work to the scientific community and the general public. Although these forms of communication are an integral part of scientific world, many scientists do not spend
enough time refining their communication skills. Too often, unattractive and overloaded scientific presentations and publications will confuse the audience and pass by unnoticed. Provided you have solid data and a story worth telling, your communication should be able to capture the attention of its intended audience. To do this, both the content and presentation of your science are important to transmit the story you want to tell.
In this intensive and highly interactive course, we will focus on basic and advanced skills in science communication. Students will be introduced to modern theories of communication and the latest trends in design and presentations. Overall, the course will provide a hands-on approach with plenty of exercises on: title and abstract writing, constructing a story, principles of design and layout, use of graphics and colours, graphs, slides, poster and

infographics, preparation, presentation techniques, delivery and effective use of voice and body and the use of new tools to prepare your communication.

By practicing and constantly refining their skills through continuous feedback from the professors and the other students, the participants will learn how to capture the attention of their audience and effectively tell their scientific story.

This course is especially meant for Master and PhD students, and younger post-docs in the beginning of their careers. In the ideal case, you will have a scientific subject to present. By the end of the course, the students will have acquired all the tools to create both effective and attractive presentations.

Although the professors speak Spanish andunderstand Portuguese, the course will be given in English. This should not stop the students from participating, because the aim is to create a positive and constructive learning environment.

Objectives

- Present and discuss modern-day communication techniques for scientists

- Learn structure for the preparation of scientific presentations

- Learn how to make effective scientific posters

- Creating an environment in which students feel comfortable, learning to communicate clearly and effectively

- Creating awareness of your own presentation style, in order to develop it better

- Integration of knowledge from science, graphic design and visual arts (theatre) in order to be able communicate science in an effective and attractive manner

Course structure

The course consists of lectures and workshops, concentrated during one work week (5 days; Monday-Friday). The course structure is such that there will be a lot of theory in the mornings, interchanged with individual and group exercises. The afternoon will be filled with intensive workshops, in which the theory will be immediately brought into practice and applied to the students' own projects.

This is a very intensive and interactive course, in which the morning lectures are not merely monologues from the professors, but require strong and constant

participation from the students' part. The students are constantly being immersed in new approaches and concepts and challenged to implement these in their own work within a very short time. In this way, the students will immediately use and appreciate the newly learned material.

In the afternoons, there will be enough time to bring the learned theory in practice, under the continuous guidance of the professors. Like this, the students can work on their project (presentation / poster) in real time, to be presented at the end of the course.

- Lectures with theory in the mornings

- Workshops (mostly) in the afternoons, implementing theory from the morning lectures

- Exercises in groups and individually

- Continuous and constructive feedback from professors and peers (students)

Course contents

Principles of Communication
Structure and storyline
Title and Abstract
"Elevator Pitch"
Visuals and communication style
Put the WOW-factor in your slides
Diagrams and graphs
Principles of Graphic Design, Fonts, Colours and Layout
Creating an Effective Poster
Infographics
Delivery (How to tell the story)
Use of Body and Voice

Evaluation

There is no formal exam of this course. However, the **students are required to attend the _entire_ course**, which will be recorded on an attendance list. The course will be concluded with a (mini-)conference, in which each of the students will present their work, integrating all the concepts they have learned during the course.

Instructors

1. Dr. Francesc Montserrat (IO-USP, Laboratio de Manejo, Ecología e Conservação Marinha)
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2. Dr. Diana Vásquez (Delft University of Technology, Países Baixos)

3. Dr. Sokratis Papaspyrou (University of Cádiz, Espanha)

4. Dr. Vanessa González (VGO Scientific Illustration and Outreach, Málaga, Espanha)

Programme

Hours	Day 1 - Monday	Day 2 - Tuesday	Day 3 - Wednesday	Day 4 - Thursday	Day 5 - Friday
9:00 – 12:30	**Welcome**, course presentation **Lecture:** Principles of communication **Lecture:** Crafting the story **Lecture & :** Titles and Abstracts **Exercise:** Titles and Abstracts	**Lecture:** Visuals and communication style **Lecture:**Principles of graphic design: Fonts, colours, layout **Lecture:** Put the WOW factor in your slides **Exercise:**Create your 'house style'	**Lecture:** Create an effective poster **Lecture:** The new age: Infographics **Exercise:** Sketch your infographic	**Lecture:** Delivery **Lecture:** Use of Body and voice **Workshop:** Use of Body and voice	**Workshop:** Mini-conference, open to the public. The students implement all they have learned and give their presentation and/or poster
12:30 – 14:00	Lunch	Lunch	Lunch	Lunch	Lunch
14:00 – 17:00	**Workshop:** Short presentation: how to "elevator" pitch your work	**Lecture:** Figures, Diagrams and Graphs **Workshop:** Figures, Diagrams and Graphs	**Workshop:** Create an effective poster	**Workshop:** Practice your presentation	**Workshop:** Mini-conference, continued

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1. Monday

1.1 Principles of Communication

Presenting your work, whether it is using slide presentations, posters or written articles, is an integral part of many professions. However, presentation is especially important in science-related work. Presentations allow you to broadcast your work to the scientific community and the general public. These presentations can make the difference in making your research known, obtaining a new job, or convincing the institution you work for to follow your suggestions. However, despite the importance of presenting, many scientists do not spend enough time refining their communication skills.

Unfortunately, most of us have been to uninspiring and unattractive presentations, for example at scientific conferences. Bear in mind that at scientific conferences, one presentation (yours !) has to compete for the attention between hundreds of other presentations and even thousands of posters at the same time. The truly memorable (poster) presentations really leave their mark on us. Why is that ? What makes a presentation boring ? What logically follows is then: What makes a presentation fascinating and memorable ?

Ask yourself: How do you picture the perfect learning environment ? Try to describe it in one word.

How does this relate to the environment of a lecture or conference hall ?

Have you ever been to a boring presentation? What do you think made it so ?

Now think of a truly exciting lecture you have attended, one you remember well, until even days or weeks after it finished. What made it great?

Simply relying on pre-determined Powerpoint defaults is not enough. In order to prepare a truly engaging presentation, there are several design and delivery rules we can follow. First we need to understand that the brain essentially functions according to some simple rules. And some of these rules are directly related to preparing or receiving a presentations.

Exercise boosts brain power. We are geared to learn by doing and moving. This rule not only applies while preparing the presentation (feeling out of inspiration ? go for a walk !), but also to the fact that it is not natural for the audience to sit around passively. This means we need to make an extra effort to engage with the audience to make the presentation memorable.

We also know that we do not pay attention to **boring things**. At the beginning of a presentation, you only have **30 seconds** to capture the attention of the audience. Once you have successfully passed the first 30 seconds, you only have captured the attention for 10 minutes, before the audience becomes distracted and starts drifting off. This means that -ideally- you are supposed to "change gears" every 10 minutes: tell a relevant story, show a relevant video, do a relevant activity, etc.

It is important to note that the brain pays attention to **patterns**. Remembering something seen before allows us to make associations and "connect the dots" more easily. An effective way to achieve this is to add some form of visual to your presentation (sections, font, colour, layout etc.). Visuals help the audience follow your story, identify the important points and feel "at home" (see "Principles of Graphic Design" on Tuesday).

The most important rule of all is that **vision trumps all other senses**. We all know intuitively that the saying "An image is worth 1000 words" is true. Merely hearing a piece of information being verbally transmitted, you will only remember 10% of it after three days. However, if you would add a picture to that, the percentage remembered after three days would increase to 65%. This is the reason why, when presenting our (scientific) work, we always should use more illustrations, pictures and graphs than text.

Rule #1
Exercise boosts brain power

Rule #4
We don't pay attention to boring things

Rule #10
Vision trumps all other senses

1.2   Preparing your presentation

Presentations for scientists are really important. As a scientist, you need to communicate your work effectively, to other scientists, the general public and administrative personnel. If we scientists fail to convey our message, others will not build upon our work, nor will they understand what we do.

For a presentation to really stand out, there are three basic traits it should have.

1. The presenter should be aware of the type of audience (e.g. scientists, government officials, lay public, school children) and acknowledge their presence during the presentation.
2. The audience has to understand, believe and remember the content of your presentation.
3. The presenter (you) should clearly convey *why* the subject you are presenting is important, not only in words but also by conveying your passion for the subject.

Why do people choose presentations to communicate ? Why don't we just write documents (short ones) ? When people are asked to deliver a presentation, the first thing that crosses their mind is panic. But it is more natural for human beings to talk in order to convey information than to write.

Can you think of any advantages of giving a presentation ? Any disadvantages ?

Giving a presentation allows direct interaction with the audience: taking questions, explaining points which are unclear. Giving a presentation also allows the speaker to read the expressions of the audience and make adjustments accordingly. Additionally, it allows you to select and emphasise key points, while leaving away unnecessary details. Presentations offer a wider variety of visual aids than just a (written) article. Finally, presentations ensure that the audience has witnessed the important information in person.

In contrast, presentations also present certain disadvantages of which we need to be aware. Presentations are a singular exchange of information so the speaker has **only one chance** to convey the message correctly, while the audience has only one chance to hear it. The audience do not have the time to look up information that they do not have at that moment (e.g. scientific jargon, difficult terms).

Unless we have allowed for interruptions, the pace of the presentation is determined by the speaker. The success of a presentation depends for a good part upon the delivery and enthusiasm of the speaker. Finally, gathering the audience for a presentation (even if it is just a weekly seminar) is often a difficult task to accomplish.

Before starting to prepare a presentation, it is very important to plan it correctly and ask yourself a number of questions.

1. Who ? Who is the presenter (you) and what is his background ?
2. To Whom ? Who is your audience ? What are they like ? What do they want from you ? How can you help them ?
3. What? What do you want to say ? What are you going to give/tell them ?
4. How ? What media are you planning to use to convey your message?
5. Where and when ? What is the venue (=conference centre) ? How much time do you have to prepare ?
6. What is the desired effect ? What is the purpose of your presentation ? To Inform, or to convince ? Perhaps to inspire ?

Once we have answered these questions, we can move on to the next steps. These are organising our thoughts, choosing the words to say, creating effective visual aids, and practicing our talk for an effective delivering. It sounds like a lot, but they are merely a matter of effort and time. There are many different presentation styles and the visuals should always accompany the style you have chosen.

1.3.1 Structure and storyline

When you give a talk, you hope your audience is ready to pay attention to you, but this is often not the case. Most people in the audience are on their laptops, sleeping, or checking their phones. Luckily, some are there to see/hear you present your work. But you want most, if not all, of your audience to be actually paying attention to you... How to manage this?

You tell them a story ! Human minds prefer stories to listed facts, but as scientists we are hard-wired to tell facts, and not stories. However, by telling a story, facts gain meaning. Stories help simplify complex information so you are more likely to hold on to and maintain the attention of your audience. Also, it is much easier to remember a story than recite a lab protocol. Telling a story will actually make you much calmer when you give a talk. Unlike the rest of the people in your session, you will have given a memorable talk ! This will help to both create awareness of your research and broaden your network, which are exactly the reasons you go to conferences.
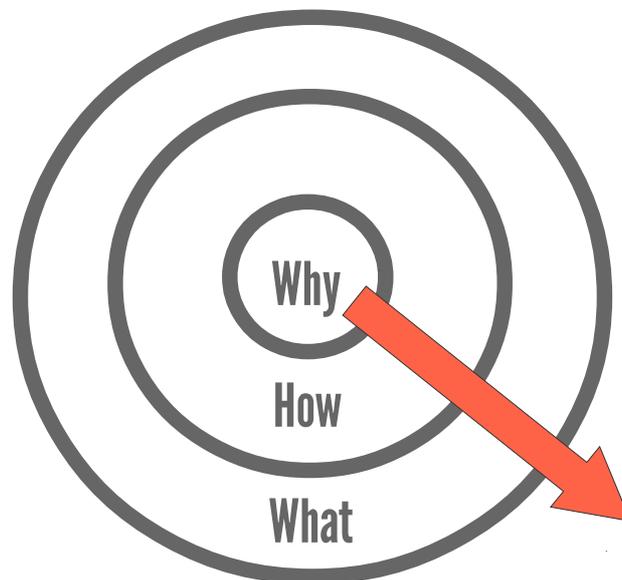
1.3.2 The Why

Simon Sinek's concept of the Golden Circle will help you in creating an engaging presentation, by starting with the Why. In science: the Why pertains to the purpose of your research. The How relates to the particular research questions and answers. The What contains your main findings and conclusion.

The Why is the fundamental part of your presentation. From the start of your presentation, you have maximum 30 seconds to make people stop checking their phone and start paying attention to you!

Answer these questions and you will find your opening slides:
1. Why do you do the research that you do?
2. Why should your audience care about your work?
3. What *idea* do you magically want to *implant* in to the mind of your *listeners*?

1.3.2.1 Exercise: What is your Why ?

" Today I am going to tell you a story concerning [**insert purpose**]…"

" To illustrate why [**insert purpose**] let me tell you a story about…"

"Here is an example of [**insert purpose**] so you can see it in real life."

Examples for Applied Research

"Today I am going to tell you **how we can change global warming before it changes us.**"

"Last year cancer killed 0.5 million people in Europe. Today I will show you **how you can avoid becoming part of these statistics.**"

" I am sure you have heard that sea turtles are dying because their stomachs are filled with plastic. **Now what if I told you we can prevent this with one simple invention.**"

Examples for Fundamental Research

"Can you imagine a world without oxygen? Well, today I am going to **tell you a story about worms that live in such a world.**"

"Recycling is a natural process not a human invention, and here is an **example of coral reefs so you understand what I mean.**"

1.3.3   The How

The How is the middle part of your story where one or several "climaxes" are presented. The climaxes here are actually new or innovative results. The How includes both your questions and results, and the (briefly explained) methodology used to come to those results.

There are three types of **story lines**, depending on the complexity of your story and which you feel comfortable using.
1. **Chronological:** This is the most typical way to tell a story, ideal for simple stories. Events are told as they have developed in the lab/field and build up to a conclusion, in a chronological manner.
2. **Converging ideas:** In science, we normally go along different paths to reach one main conclusion, especially if you have several years to develop an idea. This is helpful for broad scope projects, like PhD projects. During your PhD, you probably set up three or more experiments, each with a different target, to build upon your main research question.
3. **Step-wise**: Sometimes during our research we stumble onto more unknowns. We have one clear path but at the end it opens onto a new path, and this one yet onto another path (=research question). This is the most persuasive way to tell a story, since you set several tipping points or climaxes along the way. You can use each sub-climax or inflection point in your presentation to make a recap of what you know until then.
   If you have several questions (which may be the case), then take the time to explain each of them separately. You might even use a different method to answer each question. So rather than explaining all the methods at the beginning -followed by all the results-, explain each method and immediately the result.

Remember to **keep your methods simple.** Explain the basic concepts, so everyone understands why you chose a particular method and which type

of information it can provide. Avoid going into detail. If someone wants to follow your steps they can either read your paper, or contact you personally for details. Always use images or drawings to illustrate your methods, and remember to always take pictures in the field and in the lab. Be your own paparazzi !

Choose your results wisely, and put effort into making **informative graphs.** You do not need to include all your results, just the ones that help you tell the story.
Pick your nicest results and, -if necessary for your audience to follow the story- add some details about the experiment. Include all your data in the paper manuscript, but not in your presentation. Each graph you show, should have a clear purpose for your story: to answer a (research) question. If a graph does not answer a question, take it out ! No matter how many hours it took you to make the graph or to collect the data, a graph that does not transmit a clear message (answer to a research question), will cause a distraction from your story.

1.3.4   The What

Remember Sinek's Golden Circle: start with the **Why**, then the **How**, and end with **What** you actually did or found.
When you reach the end of your story, your audience is probably over-stimulated by all the information you just gave them. At this moment, be nice to them and show them the Big Picture. Link all your results together, and make sure to **not just list them as separate issues**. All you findings tie into the same subject and complete your story. Instead of making a list of your conclusions or main findings, get creative:

- Try to visualize your findings into a scheme, use photos, or images or even draw it by hand !

- Then take your audience by the hand and **guide them through** the scheme one step at a time. Do not let them figure it out alone ! Do not rush ! **Repeat** it to them, so it sticks.

1.4.1 Titles

The primary function of a title is to give a concise description of the scope and contents of the document, whether it is for a paper, poster or presentation.

> **A title is a concise predictor of (scientific) content**

However, a title is more than just a string of words describing your research. A good title draws attention and informs the reader at the same time. A good title serves as a form of advertisement for your work within your respective scientific community. Therefore, besides describing your work (fairly) accurately, a good title should above all be attractive. It functions as a "gateway" to the story you want to tell, inviting those interested from far away.

The title can contain a lot of between-the-lines information. It tells the reader not only what to expect in terms of content, but also the "tone". The tone can be that, for example, your work does not agree with a former hypothesis, or that an existing lemma is confirmed, or that you found something exciting, novel and/or innovative. The tone is therefore very important !

Another aspect of the title that is increasingly important in our times of digital information, is that it should be "searchable". Your work will become stored in (online) databases, which are constantly being accessed by scientists and other professionals. The relevant words in your title will be "indexed", meaning they can be found by typing in search terms. This means that the title should contain the proper **key words**, so that others can find your work.

According to The Science Editor's Soapbox (Lipton, 1998), a desirable title should have five clear characteristics:

1. **Informative:** Identify one or two main points in the paper to communicate to the audience; a good title is capable of conveying those points. Be as specific as possible without adding unnecessary details. Titles that are too vague or too general do not help the reader *distinguish your work from others*. Choose words carefully, taking into account that prospective readers will often find your article through *electronic searches*.

2. **Accurate:** The title should be *truthful about the contents* of the paper. Do not 'over-promise' the results of the paper in the title.

3. **Clear:** The audience should not have to think about what the title means. Different people may interpret the title differently, so ask a number of people to critique your title and tell you what they think the paper is about before they even read it.

4. **Concise:** Short titles are instantly recognisable and jump off the page. Every word should have a reason for being present, and each word should contribute to the message of the title. The absolute maximum number of words in your title should be 16. More than that, and your potential audience will lose interest.

5. **Attention commanding:** Not all research projects can produce an attention-commanding title, nor do all projects need them. But, if you can meet the other four criteria and have a choice between a pedestrian title and one that is a bit provocative, consider the provocative one. Ideally, titles should strive to adhere to these five characteristics. However, not all may be met or can be met in one title. For example, to write an attention-commanding title, often you have to sacrifice being less clear or informative. How much concision are you willing to give up in order to be accurate? Clearly, these are decisions for the author to make.

Lipton W. J., 1998: The Science Editor's Soapbox: An Aid for Writers of Scientific and Technical Reports. 93 pp. ISBN 0966301102

The last one of Lipton's characteristics is important, as it awakens the curiosity of a potential reader. One way of tickling that curiosity is by invoking a **concern** for that reader. Another powerful way of awakening a reader's curiosity is by presenting a **contrast**.

When constructing a title that has all five of Lipton's characteristics, make sure you deliver on your promises ! People experience it as annoying if they find out (after reading the paper or seeing the presentation) that the title did not describe the contents accurately at all, or that the "novel" process they were promised in the title, was just another way of looking at an existing phenomenon. One effect of this, is that the next time they see a title from your hand, they will think twice before spending their valuable time on your work. You would want to avoid this, and stick to Lipton's Five.

1.4.2   Exercise: Score the Titles with Lipton's Five

(1=poor, 2=adequate, 3=excellent)

Title	1 – Informative	2 – Accurate	3 – Clear	4 – Concise	5 – Attention-commanding
Selective spider toxins reveal a role for the Na v1.1 channel in mechanical pain					
Deep-sea benthic fauna: biomass and metabolism					
Detailed structure of the benthic bacterial and macrofauna community response during a prolonged phytoplankton bloom in the Western English Channel					
Reversal of ocean acidification enhances net coral reef calcification					
Strombolian eruption dynamics: insight from small scale experiments and Stromboli, Yasur and Mt. Erebus					
Evaluating the performance of different predictor strategies in regression-based downscaling with a focus on glacierized mountain environments					
Cooperative electrocatalytic alcohol oxidation with electron-proton-transfer mediators					
Tree species effects on topsoil properties in an old tropical plantation					
Effective Coverage Targets for Ocean Protection					
Nitrogen cycling in the Gulf of Mexico estuaries: How do nitrate reduction pathways differ between river-dominated and ground-water dominated estuaries ?					

Try to think of title writing as a process, just as writing the paper or preparing the presentation itself is a process. During the title writing, allow yourself to stretch your thinking during that process (Hairston et al., 2003). Writing a title takes brainstorming, drafting and revising and is very similar to the writing process itself. Because the title is very important to your paper or presentation, it is good to practice title writing, doing the following exercise.

1.4.3 Exercise: Twenty Titles For The Writer

Although this exercise may seem a bit tedious and/or silly, it actually helps to take your mind in different directions. Doing the entire exercise almost always guarantees an interesting and effective title.

1. Copy out of your draft a sentence that could serve as a title.
2. Write a sentence that's not in the draft to use as a title.
3. Write a title that is a question beginning with What, Who, When, or Where.
4. Write a title that is a question beginning with How or Why.
5. Write a title that is a question beginning with Is/Are, Do/Does, or Will.
6. Pick out of the essay some concrete image—something the reader can hear, see, taste, smell, or feel—to use as a title.
7. Pick another concrete image out of the essay. Look for an image that is a bit unusual or surprising.
8. Write a title beginning with an -ing verb (like "Creating a Good Title").
9. Write a title beginning with On (like "On the Titles of Essays").
10. Write a title that is a lie about the essay. (You probably won't use this one, but it might stimulate your thinking.)
11. Write a one-word title—the most obvious one possible.
12. Write a less obvious one-word title.
13. Write a two-word title.
14. Write a three-word title.
15. Write a four-word title.
16. Write a five-word title.
17. Think of a familiar saying, or the title of a book, song, or movie, that might fit your essay.
18. Take the title you just wrote and twist it by changing a word or creating a pun (word joke) on it.
19. Do the same with another saying or title of a book, song, or movie.
20. Find two titles you've written so far that you might use together in a double title. Join them together with a colon [:].

1.4.4 Abstracts

An abstract is essentially a single-paragraph manuscript. In your abstract, you need to condense all (and only !) the relevant information, to convince readers to -after reading your title- continue reading your paper, or to come and see your presentation. If we continue with the "shopping front" metaphor from the beginning of the "Titles" paragraph, the abstract is like thewindow, which should entice the customer (the reader) to enter the shop.

If you plan to give a presentation at a (scientific) conference, it is customary to send in a written abstract. That abstract will be judged by a committee and is thus the basis for acceptance or rejection of your work at a conference. In order to stand out from the other abstracts, it needs to be well-written and attractive. Needless to say, a good abstract needs attention and it is advisable to spend enough time on writing yours.

The abstract is a condensed and concentrated version of the scope (or full text) of the conference presentation (or research manuscript). It should be sufficiently representative of the work, as a stand-alone document. The abstract must be as detailed as possible within the word count limits specified by the conference or journal to which it will be submitted.

There are two common types of scientific abstracts: the **Descriptive** and the **Informative** abstract. The former is often used in philosophy and language studies, while the latter is most common in the exact sciences (mathematics, natural sciences).
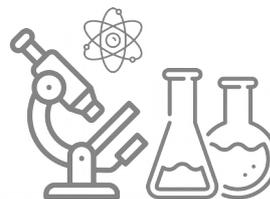
DESCRIPTIVE	INFORMATIVE
Type of information	Typical science work structure
Non-judgmental	Results, arguments
ca. 100 words	ca. 150-350 words

Below are examples of the two types of abstracts, with their respective contents:

Descriptive abstract
The two most common abstract types -descriptive and informative- are described and examples of each are provided.

Informative abstract
Abstracts present the essential elements of a longer work in a short and powerful statement. The purpose of an abstract is to provide prospective readers the opportunity to judge the relevance of the longer work to their projects. Abstracts also include the key terms found in the longer work and the purpose and methods of the research. Authors abstract various longer works, including book proposals, dissertations, and online journal articles. There are two main types of abstracts: descriptive and informative. A descriptive abstract briefly describes the longer work, while an informative abstract presents all the main arguments and important results. This handout provides examples of various types of abstracts and instructions on how to construct one.

Adapted from: www.writingcenter.unc.edu/handouts/abstracts/

Apart from needing an abstract to submit your work to a conference, writing a proper abstract will force your thinking into a structure that is needed to make and prepare your presentation. The structure consists of five main components that make up a logical abstract, which contains all the relevant information for the reader.

The structure starts with one sentence of introduction, in which it should become clear **why** this work is being done. Following comes a sentence explaining the study subject. Continuing, one sentence, maybe two, from which becomes clear **how** you have addressed the matter at hand, which approaches and/or methodologies were used. One or two sentences describing **what** you found during the work, after which one more sentence is used to place those findings in a wider **context**, **the bigger picture**.
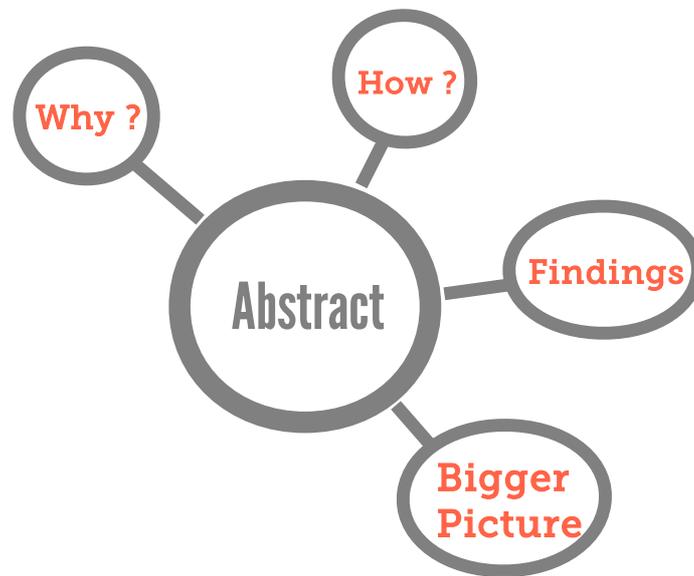
Writing an abstract is not an easy task. The key trick is to plan your argument in six sentences, and then use these to structure the entire paper or presentation:

Introduction. In one sentence, what's the topic? Phrase it in a way that your reader will understand. Assume the readers are peer reviewers or the selection committee for the conference, and they are thus somewhat familiar with the general field of research, but need to tell them specifically what topic your work addresses.

State the problem you tackle. What is the key research question? Remember, your first sentence introduced the overall topic, so now you can build on that, and focus on one key question within that topic. If you cannot summarise your paper/presentation in one key question, then you don't yet understand what you're trying to write about. Keep working at this step until you have a single, concise (and understandable) question.

Summarize (in one sentence) why nobody else has adequately answered the research question yet. For a PhD thesis, you'll have an entire chapter, covering what's been done previously in the literature. In the case of an abstract, you have to boil that down to one sentence. But remember, *do not* to try and cover all the various ways in which people have tried and failed; the trick is to explain that there is this one particular approach that nobody else tried yet (it's the thing that *your research does*). But here you are phrasing it in such a way that it becomes clear that it is a gap in the literature. So use a phrase such as "previous

work has failed to address...". **Explain, in one sentence, how you tackled the research question.** What is your big new idea / approach / methodology ?

In one sentence, how did you go about doing the research that follows from your big idea. Did you run experiments ? Build a piece of software ? Carry out case studies ? Remember, the word 'abstract' means a summary of the main ideas with most of the detail left out. So feel free to omit detail !

As a single sentence, what's the key impact of your research? Although main findings are important, here we are not looking for the outcome of an experiment *per sé*. We are specifically looking for a summary of the implications. What does it all mean ? Why should other people care ? What can they do with your research ?

1.4.5 Exercise: Analyse the Anatomy of an Abstract

(1) The first sentence of an abstract should clearly introduce the topic of the paper so that readers can relate it to other work with which they are familiar. **(2)** However, an analysis of abstracts across a range of fields show that few people follow this advice, nor do they take the opportunity to summarize previous work in the second sentence. **(3)** A central issue is the lack of structure in standard advice on abstract writing, so most authors do not realize the third sentence should point out the deficiencies of this existing research. **(4)** To solve this problem, we describe a technique that structures the entire abstract around a set of six sentences, each of which has a specific role, so that by the end of the first four sentences you have introduced the idea fully. **(5)** This structure then allows you to use the fifth sentence to elaborate a little on the research, explain how it works, and talk about the various ways that you have applied it, for example to teach generations of new graduate students how to write clearly. **(6)** This technique is helpful because it clarifies your thinking and leads to a final sentence that summarizes why your research matters.

1.4.6 Exercise: Write Your Own Abstract

Now that you have all the tools, write the Abstract for your own presentation, poster or paper manuscript. Use the anatomy described above.

1.5 the "Elevator Pitch"

There will be, or maybe have been already, many moments on which you need(ed) to explain your research and its significance to people who know very little to nothing about your line of work. In fact, the vast majority of the people in the world are not scientists. This means they communicate in a fundamentally different way than we -scientists- do. It is therefore safe to assume that almost everyone you meet, will have no clue what your work is all about. This makes communicating about your work in a short amount of time both challenging and exciting !

The time you have to explain your present work in an attractive way, to a person who may or may not have any professional background related to your own, is **maximum one minute**. This is the time you would spend on an average (long) elevator ride. The trick here is not to explain your work in a typical scientific manner, but rather present it as a sales pitch. You are actually trying to "sell" your work, and in doing so, trying to make it as attractive as possible. This is the essential function of the so-called "elevator pitch".

The elevator pitch does not only work in an elevator ride. Think of the following situations in which you need to orally describe your work concisely, in an informal setting:
- a short encounter with a scientist (in your field) at a conference
- introduction around a table before a (professional) meeting
- conversation at a reception or a party
- talking to a potential future employer
- a "promote-your-poster" short session at a conference
- at an actual poster session, discussing with colleagues
- explaining your work to family members or friends

You may now think: "But my work can not / never / impossibly be squeezed into one minute !". The point is not to tell everything, but to make people interested in your work and **make them come to you** for more information. The goals of a typical elevator pitch are:
- to create a memorable and positive impression
- to open the door to further conversation

In that sense, the elevator pitch is quite similar to an Abstract. However, the difference should be obvious: an Abstract is aimed at people who work in your field, while an elevator pitch is directed at anyone who shows the slightest interest in your work.

There are some guidelines for crafting your pitch:
1. use "active" verbs. Say "I analyse…" or "We demonstrate…".
2. Try to find a "pull", meaning that you have find a way to pull the the audience in. For example: "You may have heard of sea level rise due to climate change ?".
3. Issuing a concise statement that generates interest, or a response to an actual question is a good way to start an elevator pitch.
4. Try to avoid excessive jargon, and keep the language to explain your work simple.

ACTIVE VERBS

Analysis	Application	Synthesis	Evaluation
analyse	apply	combine	critique
define	argue	construct	defend
categorise	articulate	create	evaluate
classify	conclude	design	interpret
compare	defend	formulate	justify
contrast	demonstrate	frame	reassess
systematise	differentiate	integrate	re-envision
	employ	merge	
	establish	project	
	extend	solve	
	hypothesise	synthesise	
	illustrate	unite	
	implement		
	propose		
	theorise		

Also check:
https://www.nature.com/naturejobs/science/articles/10.1038/nj7435-137a

Use these approaches in guiding your audience when you deliver your pitch. Be careful not to give too much (detailed) information, you might lose the audience entirely ! Rather, aim at generating interest, so that the audience will ask you questions, that you should be able to answer easily. Just as with the Abstract, take your time in preparing the pitch. Spending several hours or even days on creating your perfect pitch, is absolutely normal.

Write down your pitch. Putting the words on paper will help you memorise it and shape your thoughts about what it exactly is you want to say. Once you have perfected your text, practice it. Use your pitch text as often as possible. Use it at family meetings, with friends, colleagues, and even people you don't know, but end up talking to. After several times, you will notice which part of your text works well and what needs to change. You will notice it becomes much easier to communicate about your work, and that people appear more interested !

2. Tuesday

2.1 Visuals and communication styles

In the old days, there was only the blackboard on which the presenter would write, as (s)he would tell the story by heart or reading from notes. Later, as technology would advance, we started using slide projectors, to show dia-positives and overhead projectors to show transparencies, to accompany our presentations. And then, during the beginning 1990's, Microsoft came with the easy-to-use presentation software package Powerpoint, with analogues for other operating systems.

Despite the technological advances, the quality of presentations have not dramtically improved. If anything, it is quite the contrary. Nowadays, we are overwhelmed by presentations which fail to inspire. Why ?

Some of the most common mistakes include:
- the lack of informative titles on slides
- the extensive use of bullet lists
- the lack of images
- the use of distracting backgrounds
- too much text on any given slide, including the Title slide
- graphs and figures which are too small to reader
- and sadly enough, many more...

Apart from the fact that there are simple principles to follow in making attractive and effective slides, the **presentation style** is also important. There are many different presentation styles and each one is appropriate for a specific audience or venue.

Assertive-Evidence style: Promoted by engineer Michael Alley at UPenn, it pretends to follow the classic scientific presentation structure with some basic principles to follow. Each slide has a clear informative title of up to two lines with the main **assertion**. This assertion of the slide is accompanied by a picture or graph supporting it, the **evidence**.

Kawasaki 10/20/30: This is a style of presentation, in which you are supposed to have **10 slides** only, with the main ideas, **20 minutes** of time and use at least **30pt font size** letters.

PechaKucha 20x20: Mostly directed to artists, designers and architects, PechaKucha 20x20 is a simple presentation format in which you show **20 images, for 20 seconds each**. The images advance automatically and you give your talk with the passing of the images.

Lessig: The Lessig method is based upon the use of hundreds of slides, with each only one word or picture, which simply follow the voice of the speaker. Because the speaker needs to talk fully synchronised with the slides, this method needs a lot of practice. Obviously, there is no room for improvisation.

TED (Technology, Entertainment, Design): This type of talks, organised by a successful media oganisation, do not always follow the same rules regarding visuals. Often, the presenter uses only the typical "TED style" slides which feature large pictures. Sometimes the speakers work with actuals props, and sometimes there are talks without any visuals at all. However, the TED talks do follow certain rules related to the strict adherence to the time limit, the use of personal stories, the use of storytelling principles to structure the talk, making references to other talks, life changing events, discoveries or innovations.

In the search for the "perfect science presentation", we may use elements of several presentation styles.

2.2.1 Principles of Graphic Design

Graphic design is about communicating information through visuals. All sorts of information can be communicated through visuals, from a "No Parking" street sign to an instruction manual.
Because we live in an era of massive supply of information, there is a strong need to communicate information effectively. Due to the overload of information we become overstimulated, and so the information is not transferred optimally. As a graphic designer, we have to make information easy to digest, so it can be understood in the second that the audience (you) look at a poster, in a magazine or at a slide of a scientific presentation.

Graphic design is most obviously used in advertisements. This is logical, because commercial companies need to confer a clear messsage: "CHOOSE ME !". Therefore, graphic designers create visuals that are easy understandable and -most importantly- **memorable**. To make the information attractive, easy to understand and memorable, graphic

design uses some rules to evoke in the audience different **emotions and desires**.

Composition

The human brain loves well-balanced compositions, with a certain obvious order. We can summarise 3 types of order:

1. **Unity:** All your slides, or other products (posters, business cards) should share something in common. The human brain loves to be in its comfort zone. Unity helps to follow the story of your presentation, because after a while the brain relaxes and does not expect any surprises. In this way, you help the audience to focus on the story you are telling. Be sure to use the same unifying colour(s), typography and/or pictures in all your media, so people can relate your talk with your poster, your poster with your visit card, etc.

2. **Space:** Using space in your slides is bit of a contradiction, because our brain loves to see open and relaxing spaces, but it also feels the need to fill it. The more space, the more you can focus on the subject of your slide or poster. Think of empty space like an object that you have to include in your posters or presentations.

3. **Alignment:** Our brain loves the order of objects aligned and fitting well in their spaces. By aligning the elements you create clean and sophisticated images.
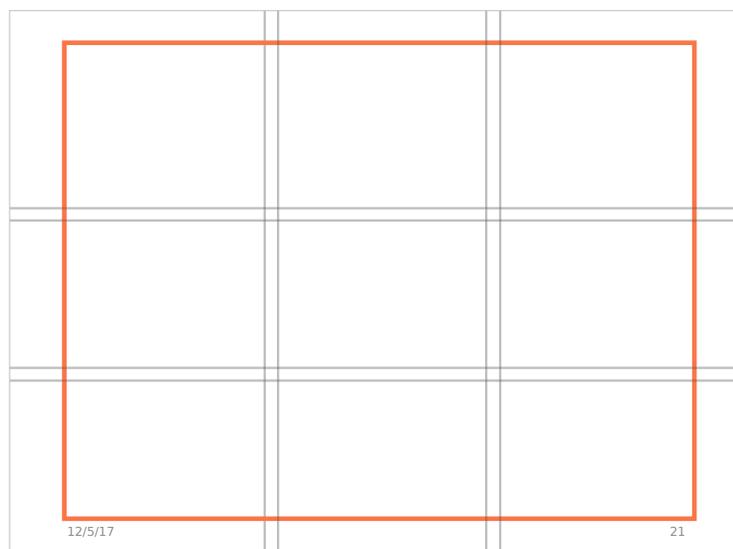
An important tool to optimise the composition of your slides, is to **create grids**. Start with creating margins, so your elements will not be touching the borders. Then, create a grid, which can be of 3 x 3 rectangles, or 4 x 5, or in fact any configuration. The idea is to have a "map" to follow. In this way, the elements are organised in a certain order, which we follow in all the slides. The grid also helps to follow a order to read. Western people, using a Latin alphabet, read forming a Z: starting top left to the right, jump back down left and read the bottom line.

Typography

Typography is important in graphic design, because it evokes emotions. We remember things through associations, and through emotions we create associations, either positive or negative. Emotion therefore increases **motivation** and dominates **decision making**. Once we have defined the emotion, we **give a personality** to that product and we interact with it according to that personality. Again, commerical companies are aware of these effects, so they create typography to match their brands. Give your work a personality to communicate better, by selecting a fitting typography !
There are three things to consider when selecting your typography:
1. **Context:** is it going to be a serious, professional presentation, or something for younger kids ?
2. **Legibility:** your typography has to be easy to read.
3. **Serif or Sans ?** Is your typography meant for printed text or for a presentation on a screen ? For printed text, choose a serif font, while for presentations, make your main typography a sans.

Colour

Colour is also very important in evoking emotions and associations. Blue, for example is associated with cleanliness, clarity and credibility. Red, on the contrary, is associated with awareness, arousal and excitement. Colours can be used to emphasise and to bring elements to attention. However, avoid distractions and limit yourself to **using only three colours**, including the (white) background colour. Your three colours become then: **(1)** the background colour: either white or black are recommended; **(2)** the middle colour: either black, dark grey, white (if you have a dark background); **(3)** the accent colour, which serves to put emphasis on certain elements. Below are several examples of the use of only three colours for the background, middle and accent.
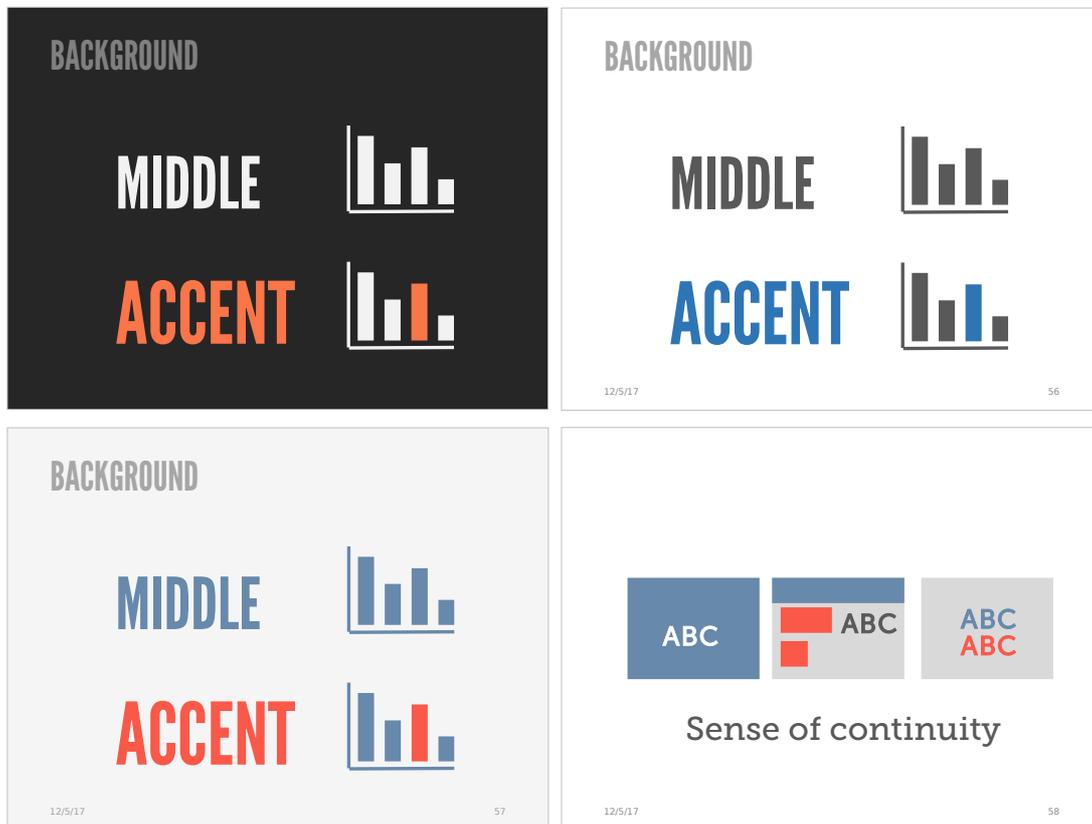
Try and find inspiration for colours, both in your surroundings and in pictures. Normally, when we find a picture beautiful, we do not realise *why* we find it beautiful. However, if we look carefully, it can be observed that the colors really "fit together". There exist many (graphic designers') resources on the internet, with which colours and typography can be selected and combined.

Fonts: http://www.fontsquirrel.com ; http://losttype.com
Colours: http://www.design-seeds.com ; http://color.adobe.com

By using composition, typography and colour, you can create a sense of continuity and balance in the design of your presentation. This makes the slides very pleasant to look at, and will help transmit the message (your story).

2.2.2 Put the WOW-factor in your slides

When you give a presentation, you do it for one simple reason: you want to tell the world something new. And for this to occur, you need your message to come across. On the contrary: if you start your presentation thinking it is boring, your audience will probably become bored. It it thus good to invest some effort into your presentation.
You can increase the attractiveness of your story by visually stimulating your audience through your slides. Your slides are your support system; they- should offer a visual representation of your words that will hook the attention of your audience, wake them up, and help them follow your storyline. Once you have a story, which is simple, easy to follow, understand and remember, the visual aids become essential your talk.

Information is first received through the visual system, as images. This because images require less effort to process and are easier to memorise. Images can easily generate emotions: it is enough to see an image of a delicious plate of food to get your mouth watering !

Remember: **well-designed slides** will not make your story automatically a success, while a good story can be **obscured** by horrible looking slides. A general problem encountered in contemporary presentations is that slides are full of information and look very busy and **distracting**. This gives the wrong impression of yourself (chaotic) and your work (unstructured). Presenters often **read from the slides**, rather than using them as visual aids. Slides full of text show you are insecure and do not know how to synthesize. Also, the text will cause the audience to read, while you are talking, and so they will not hear what you say.

Here we will provide 6 easy-to-apply tips to design a presentation like a professional:
1. **Use images:** Rather than writing your entire story on the slides, tell it through images ! Use images that invoke emotions, that transmit your passion for your research. Each slide should advertise your research, so be your own journalist ! We all carry cameras in our pockets, so force yourself to constantly take pictures about your research experience. An alternative is searching for images in online photograph databases, like foter, picjumbo, pixabay or flickr. Be sure to keep your used images sharp, clear and undistorted.
2. **Think BIG:** Use big images, big letters, big graphs. A good rule-of-thumb is to **make your font size double the average age of your audience.** Use hierarchy among the slide elements to highlight the most important message.

3. **Creative graphs:** Make your data clear and easy to understand ! Rather than using tables, bar plots and pie charts, try alternative visual representations. Classical "Powerpoint" slides typically have low (screen) resolution and limited space. Therefore, it is best not to use the same (conventional) graphs, that you would use for your manuscripts. Do not copy/paste graphs from articles, as they are not meant for presentations.
4. **Use symbols:** Symbols and icons are meant to make an idea or a process fast and easy to comprehend. You can download many icons from websites such as flaticon.com and picol.org. The IAN Symbol Libraries is a free platform since 2005, that offers special icons for scientists.
5. **Typography:** We already know that fonts -like colours- can also evoke emotions. Typical "serious" fonts are found in printed media like newspapers (Serif), while more "relaxed" fonts (Sans) are used by companies that want to evoke emotions that connects you to them. Because of the low resolution of screen presentations, it is best to use Sans fonts.
6. **Limit your colours:** Choose 2 or 3 colours for your entire presentation. These three colors should serve to contrast each other and thus help you highlight important aspects in each slide.

> "To present a scientific subject in an attractive and stimulating manner is an artistic task, similar to that of a novelist or even a dramatic writer."
>
> Max Born (1882 – 1970), German-British physicist

2.2.3　　　Exercise: Design your own House Style

Use the principles you have learned above to create your own "house style". Choose typography, colours and a grid and apply it to your slides. Create the Title slide, one text slide and one slide with a graph or figure.

2.3　Figures, diagrams and graphs

One of the most important parts of your presentation are your findings, or in other words: the data. Scientists convert all the data from the lab into graphs to identify trends, patterns and anomalies. This process of exploring your results is very interesting, but remember you need a

strong focus in a presentation. Most probably, not all your results are necessary to tell your story. You may include many or all of them in your paper manuscript(s), but you will need to go through all your graphs and select those that **really** help tell your story. You want to avoid showing everything that you did, just to show to people that you did a lot. Too much data is overwhelming, boring and will ultimately distract from your main storyline.

How do you choose between all your beautiful data and graphs ? The main approach is to be aware of your story, and stay its course.

What is the purpose of the figure ? If the particular figure or graph really helps telling your main story, then keep it in. If it is only indirectly related, or merely a side story, or it is not at all related, discard it. This may sound strict, but remember that any slides which show anything that distracts from the main story should not be in your presentation. After a rigorous selection procedure, organise your figures in such a way that together they tell a story.

Discard non-sense figures. Again, this is to keep your story clean and clear. Graphs which show no differences, or graphs that are not part of the main story, or graphs that essentially repeat data, all have to be discarded !

Start with a sketch. Use pencil and paper to make big sketches of your data in a simple and accurate manner. Perhaps you can visualize your data in a different way ? Try and find out, tap into your creativity !

Choose your graph type wisely. Use tables for exact data, or show central values directly, in a concise way. Use bar plots for comparisons, and scatter plots for correlations. Line plots are used to show trends. Make diagrams to show processes or networks.

The black sheep of the graph family is the pie chart. Please, never use pie charts ! Pie charts are difficult to read for our brain, because they force us to compare areas (or actually angles). Not too long ago, pie charts were often used, in both publications and presentations, but this has fortunately changed. Pie charts can (almost) always be replaced by a better alternative to represent the data in question.

Keep graphs simple and accurate. Avoid using the enhanced graphics options (shadows, 3D effects, grey background), which are found in most graph software packages, such as Microsoft Excel. Because you have the option, does not mean you should use it !

Once you have selected the relevant data to show in your presentation, you can use these 10 guidelines to prepare your beautiful graphics:

1. Reduce no-data ink: If the graphs contains "ink" which does not show data, eliminate it.
2. De-clutter the axes: use fewer numbers along the axis, and increase the font size dramatically. Please remember to use a scale that is relevant to your processes or settings, and make sure you do not represent your values in a misleading way. For example: with percentages, start your axis on 0 (zero), so percentual increases and decreases are correctly shown.
3. Big (axis) titles for presentations: Replace your small, unreadable titles for large ones, that can be read without turning their heads (always use a horizontal orientation).
4. Data are the main characters of your story. Eliminate any "effects" in your graphs.
5. Use colours with distinct hues (= different scales of grey), so they are clearly different even for colour-blind people.
6. Make colour and size proofs: Print a graph in grey-scale and make sure each colour is different. If the colours come out with clearly distinct grey scales, the colours are well visible for everyone. Check the font size of the titles and axis: they should be readable from a distance, not just when you have it in front of you.
7. Contrast is your friend: Highlight the most important data for your story with different colors or thicker lines.
8. Decode abbreviations and labels: change abbreviations of treatments or experiments into concise, meaningful labels. In this way, the audience can follow your story easily, without having to remember what each abbreviation or label means.
9. Order ensures continuity and helps to digest information: choose one colour, shade and/or shape for each treatment or experiment, and maintain it throughout the presentation. You should be able to use the same legend for all your figures.
10. Spot the ducks and kill them: "Ducks" are elements in an image that add no value, other than to distract or entertain the viewer. Although we truly like water-birds, all ducks have to be eliminated !

3. Wednesday

3.2 Creating an effective poster

At a scientific conference, there are traditionally two types of presentations scientists can choose for: oral or poster. Oral presentations are seen as more prestigious than poster presentations, but they are not necessarily the best way to reach a targeted group of scientist. Everyone attending a series of oral presentations has a specific affinity to the subject of the session. However, everyone that stops at a poster is engaged and interested in the details of that research within the broader scope of the session.

Giving a poster presentation narrows your audience to a group of scientists that work within your specific research line. This pre-selective process may promote both stronger collaborations and exchange of ideas. In addition, poster sessions are the places where you can find the newest advances in science. If there is a subject on which the scientists in question are still working, but they want to present their progress, a poster is an effective way to bring that work to the attention. Posters thus allow for more direct feedback and brainstorming to take the research to the next step.

The main **characteristics of a good poster** are that it:
- is readable from 1-2 m away
- has a catchy title
- has a nice, aesthetically pleasing colour palette.
- contains attractive images
- has a clean and organised layout

You will have noticed from the above characteristics that -initially- the actual content of the poster does not matter that much. The point is first to catch the attention of your audience, which is usually walking by. Once you have caught the attention of an audience, the content becomes relevant. From that moment on, make sure your scientific poster also:
- has a clear, concise and easy-to-understand text
- contains meaningful and informative graphs
- can be read within 5-10 minutes

How to design your poster?

Choose a software package / computer program to create your poster.
MS Powerpoint is a popular and easy-to-use option. Adobe Illustrator, Photoshop and InDesign feature professional software, and thus are more complex to use and more expensive. Open-source programs include LibreOffice Impress as an alternative to Powerpoint.
Inkscape and GIMP are graphical software packages, which are very robust alternatives for anything Adobe has to offer.
Applications such as Gliffy, Lovely Charts and the open-source mathematical software R can be used to create entirely user-defined charts, diagrams and graphs.

Size and orientation: check the website of the conference to find the requirements for the poster presentations. The standard poster size for most conferences is A0 (1189 x 841 cm), and both horizontal (landscape) and vertical (portrait) formats are widely used. Once you check the requirements go to page setup and define them before you start designing the poster. Be aware that the standard settings in MS Powerpoint are US settings. These are very different from the standard A0 size settings in centimeters, and may give you difficulties at the moment you want to print your poster. Make sure to adjust the settings **before** you start on your poster.

Layout: Use a grid on your poster to distribute the different parts of the story you want to tell in an organized manner. For vertical poster a grid of 1 or 2 columns and 4 - 5 rows is recommended. For horizontal posters a grid of 4 columns by 3 - 4 rows is recommended. Depending on the data you want to present, you may merge different cells of the gird, but be sure to stick to the grid to distribute the space on your poster.

Content: A rule-of-thumb is to distribute your poster into 20% text, 40% images, 40% space. This seems rigorous, but remember what has been discussed on the use of space and text in slides: the same goes for posters. Space invokes peace of mind, tranquility and will therefore make the poster more attractive.

Text: Use between 300 and 500 words **in total** to tell your story. Use your abstract as a guideline, because it uses few words to tell your story and states the why, how, where and what of your research.
Place the purpose (the Why) and the conclusion or implications of your research at the top of the poster. In that way, the most important part of

your research (the conclusions / implications), will be read first and most, after your title. Institution logos, references and acknowledgments are optional (really !), because they do contribute to your story. However, some supervisors or labs specifically ask to include their logos. In that case, do your best to fit it in, but do not make it bigger than absolutely needed.

Visuals: Just as with slides, try to replace ideas with images whenever possible, by using icons, diagrams, graphs and (large) photos. For example, use images from field campaigns to show the experimental design that was used. Ensure the photographs have a relatively high resolution of 150-300 pixels per inch (ppi). To illustrate your main objective, create diagrams using different icons. Also use icons and diagrams to illustrate the different treatments used, rather than just listing them. Do not use abbreviations ! Invest the effort to design a diagram, which shows the "big picture" of your story and try to condense the main conclusions into one or two images. Be creative ! When placing the graphs in your poster, remember to make/keep them simple, with clear axis numbers, contrasting colors, and understandable legends, without abbreviations.

Poster Design Basics:
- Use the grid to keep the poster organised
- (Font) size matters ! Titles 85 pt, Authors 56 pt, Heading 36 pt, Body text 24 pt, captions 18pt
- Use **Sans** fonts for titles and **Serif** fonts for body text
- Do not use all capital (ALLCAPS) letter words and write in full sentences
- **Highlight** or <u>underline</u> important words or ideas
- Left-align all your text boxes and use 50 characters per line as the standard width
- Bullet points are useful on posters
- Choose 2 or 3 colors for the entire poster including graphs and background
- Do not use images for the background of the poster ! Keep the background simple either one dark color, white or -if you really have to- use a very mild gradient
- Use boxes to group the different sections of the poster to increase easy reading

Pre-conference feedback: Once the poster is finished, print it at size A4. Everything should be readable in this size ! Then, hand out your poster to colleagues, family and friends and request feedback. Ask for 2 or 3 pros

and cons from each person and leave the room. Do not stay while they formulate their comments; it will make the comments more honest and thus more constructive.

Presenting your poster: If you feel like hiding when it is your turn to stand by your poster, don't ! You (should) want to talk to people about your research, and presenting a poster is a great opportunity to do so ! Look at the people passing by, make eye contact, smile and greet them. If someone stops at your poster, interact with them. Tell the person you are there in case they have any questions, and then give them some time and space to look at your your poster. Have your **elevator pitch** ready to sell your science and reel them in! Make sure you can explain your poster in no more than 5-10 minutes. Have your story ready, speak clearly and try to have an conversational interaction with the viewer/visitor, rather than speaking to the poster. Poster sessions are normally quite loud, so make sure they can hear you. It therefore very important to practice the **belly-breathing** (more on this on Thursday: Use of Voice). This will stop you from screaming, and losing your voice by the end of the poster session.

Gimmicks and publicity: Make sure to have a few A4 copies of your poster, with the abstract and your contact information printed on the back. This way, interested persons can take your poster with them and read it again. Remember that the A4 verison of your poster should be readable ! You can leave your business cards next to the poster, or a note with your phone number inviting them to contact you. Using the same colour scheme and fonts for your business cards, increases the sense of continuity and thus the memorability of your poster. Nowadays, there are people who add a QR code to the poster, which opens a link to their web page or an online version of their poster.
Some people even hang a little bag of candy or cookies to lure visitors to their poster. Do what you feel comfortable doing, but do not be shy.

3.3.1 Infographics

In this day and age, the use of infographics (a compound of "information" and "graphics") has become wide-spread. An infographic is a graphic visual representation of information, data or knowledge, intended to present information quickly and clearly. Infographics are attractive because they condense many types of information: maps, text, illustrations, graphs on a relavtiely small space. They provide an accessible way to present otherwise relatively dense information. Infographics originate from the world of newspapers and periodic journals, and were initially used to improve the transfer and digestion of

"boring" information, often centered around an attractive figure or illustration.

There are several types of infographics, displaying information about distinct subjects in distinct manners:

- **Situation:** describing a situation or event, often centered around a map; used for geo-political situations
- **Sequential:** also describing events, but with a clear sequence
- **Process:** describing processes and/or networks, like companies or businesses
- **Informative:** providing information on a subject or news item
- **Scientific / informative:** essentially informative, but with a clear scientific content; used to advance scientific knowledge

Nowadays, there are also graphical representations of information that are distinctly not infographics. With the ease of access to digital and graphical methods, there are many ways to display information in a creative and attractive manner. However, merely displaying information in a graphical way is **not the same** as creating an infographic. Infographics contain many types of information an data, visualised in different ways.

By now, it will (hopefully) not surprise you that there are some relatively simple rules that accompany the creation of a good infographic. Just as with posters and presentation slides, the most important rules that should be obeyed in making an infographic are:

The Grid

Just as with presentation slides and posters, infographics derive their visual attractiveness in part from the use of grids. Apart from it enhancing visual esthetics, the grid helps to divide the information in groups over the canvas of the infographic.

Information Hierarchy

The grid also helps in visualising the hierarchy in the information. Notice that the most attractive block of grid cells contains an illustration of the central subject, accompanied by the most important information. Diverging from this block, other blocks of both text and graphical information are placed.

Readability

The hierarchy found in the infographic by using the grid is a tool to improve its readability. The information can be clustered along the information hierarchy, following blocks with more important information to those with less important information. In this way, the reader can focus her/his attention more efficiently.

Visual resources for creating graphics, illustrations and figures can be found on the internet, either for free or against a (modest) cost. Careful selection of visuals will result in a professional-looking infographic.

There are also several things to avoid when creating infographics:

1. **Lack of content:** many so-called "infographics" have a surprisingly low information content, and just display some fun fact or a single series of data. A good infographic should be full of information, displayed in an attractive manner.
2. **Reading order:** Remember that those using a Latin alphabet, read left-to-right. In fact, the *lingua franca* of science is English, and thus by default a Latin, left-to-right reading direction is needed (unless of course, you are preparing a presentation/poster/infographic in Arabic, Hebrew, Urdu, Farsi or Kurdish). Infographics that "start" from the right -or worse, bottom-right- , are intuitively confusing for the reader.
3. **Graphic "junk":** In some (bad) infographics there are graphics that use up a lot of space, while not containing any information. These graphics are merely used as a "filler", and actually diminish the total information content.

3.3.2 Exercise: Create your own infographic sketch

Before creating an infographic, start with a sketch. Use this sketch to develop your storyboard and distribute the information over the infographic canvas. Revise as needed.

3.3.3 Exercise: Make your own poster

Now, with all the tools, tips and tricks you have learned, make your own poster. Use your abstract for the text and use your house style for the colours and layout. Think of a nice and appropriate grid to divide the space in your poster. We will look at the posters at the end of the day.

4. Thursday

4.1.1   Delivery

Now that we have treated all the basics of crafting your story and the way it can be presented graphically, we will focus on *how* you bring the story: the delivery. Delivering a story is very important, because it contains most of the non-cognitive information. It also establishes a connection between you as a representative of the message (your story), and the audience as receivers of that message. If you can connect with the audience, they will connect (better) with your story.

Important aspects of giving a good presentation are to **prepare well** and to **practice your presentation**. You need to know your entire story, and you need to know the steps that take it from A to B. Practicing that story until the point that it feels natural to you, brings you to the point that you can "play with it". You can now start identifying key points and emphasise them with your body and voice.

You may be anxious or excited to give your talk, which is perfectly normal. The key is to realise that you have a good story to tell to your audience. They are there out of their own free will, and they are interested in what you have to say. Think of a presentation more as a gift for the audience, or maybe a journey on which you are taking them. This instantly changes the whole experience and your role in it. It is up to you to make that experience memorable.
You may feel extra anxious because you have what is known as an **introverted** personality. Or, you may feel very excited because you are more of an **extraverted** personality. Both personalities each have their own qualities, and giving a good presentation is certainly not reserved to only one personality type !

The **personality types** mainly have to do with where you get your energy from. This has severe implications with how and under which conditions you need to prepare your presentation. Below are general descriptions of the two personality types:

Extraversion
I like getting my energy from active involvement in events and having a lot of different activities. I'm excited when I'm around people and I like to energize other people. I like moving into action and making things happen. I generally feel at home in the world. I often understand a problem better when I can talk out loud about it and hear what others have to say.

The following statements generally apply to me:
- I am seen as "outgoing" or as a "people person."
- I feel comfortable in groups and like working in them.
- I have a wide range of friends and know lots of people.
- I sometimes jump too quickly into an activity and don't allow enough time to think it over.
- Before I start a project, I sometimes forget to stop and get clear on what I want to do and why.

Introversion
I like getting my energy from dealing with the ideas, pictures, memories, and reactions that are inside my head, in my inner world. I often prefer doing things alone or with one or two people I feel comfortable with. I take time to reflect so that I have a clear idea of what I'll be doing when I decide to act. Ideas are almost solid things for me. Sometimes I like the idea of something better than the real thing.

The following statements generally apply to me:
- I am seen as "reflective" or "reserved."
- I feel comfortable being alone and like things I can do on my own.
- I prefer to know just a few people well.
- I sometimes spend too much time reflecting and don't move into action quickly enough.
- I sometimes forget to check with the outside world to see if my ideas really fit the experience.

4.2.1   Use of body

Searching for tips on the use of body and body language in presenting, you will find many, accompanied by even more explanations. However, you only need to remember a couple of them:

1. **Face** your audience. This may seem obvious, but **do not, ever (!)** turn your back on the audience. Always turn your body "opening" to your audience. There will be some discussion on positioning later on.
2. **Open** your body posture. This will enhance the connection between you and the audience. Do not fold your arms in front of your chest.
3. Do not move too much, it will only **distract** from your story.
4. **Smile !** Have fun and show it: it works contagious and is attractive for the audience. Smiling or even a real laugh only work when they are real. Fake smiles and/or laughter are easily recognised.
5. Look toward your audience and make **eye contact**. This may be the most difficult part of connecting with the audience, but it is essential to make the full connection.
6. Use **gestures** to connect with your audience and to guide them. Gestures will make the audience more receptive for your story. Beware to keep your gestures reserved, and do not exaggerate.

4.2.2   Positioning

Your position in relation to the screen, or the object you are presenting, has a strong effect on your presentation as a whole. The basic rules of positioning are:

- Do not to block the view
- Stand on the starting end of the reading direction (mostly left)
- Stay within your **movement triangle**

The standard position is the centre of the "movement triangle". The movement triangle runs from the person furthest to the right from you, in a straight line to the wall in front (behind you), and towards the side of the screen closest to you (to your left):
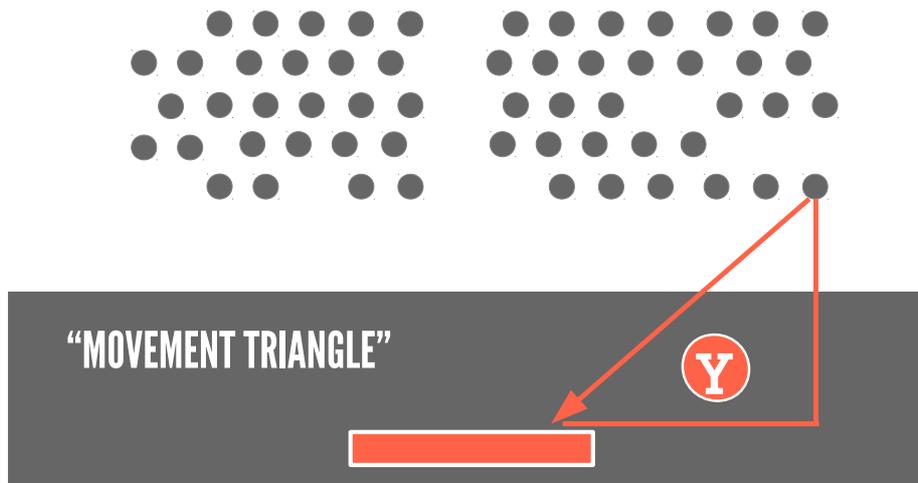
You can move more or less freely within the movement triangle, but keep your movements to a minimum. Avoid stepping out of the movement triangle (through the diagonal side), as this will block the view for the viewers to the right of you:
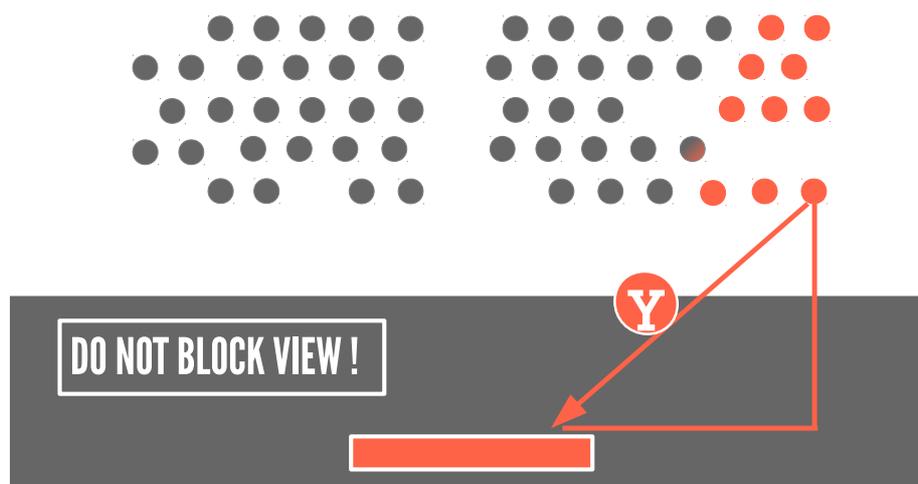
When you have a complex figure or other visual component of your presentation on screen, move towards the back end of the movement triangle, almost level with the screen. Turn slightly towards the screen, so that your left shoulder points toward the side of the screen. Like this, you focus the attention on the visual:

COMPLEX VISUAL
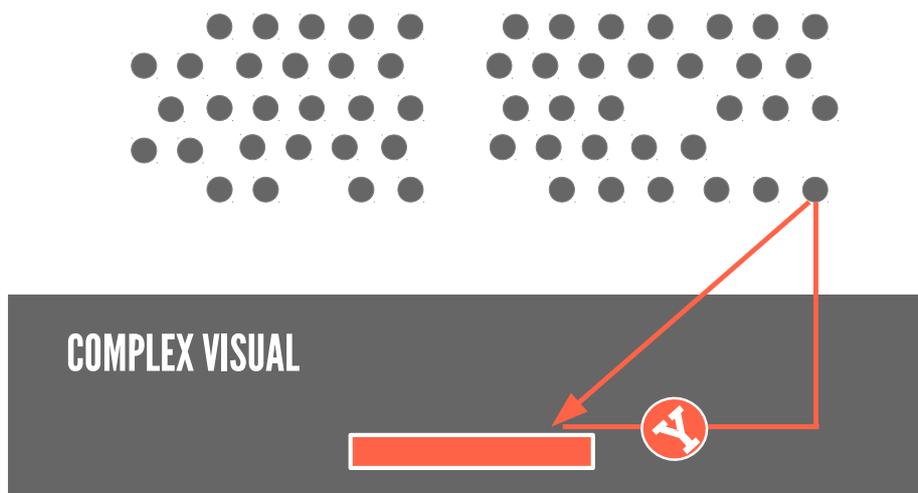
When you want to connect with your audience, you move forward towards the very edge on the diagonal of the movement triangle. This is especially important at the start of your presentation. But also when you want to express a strong point, like a conditional outcome, a twist in your story, or a conclusion:

CONNECT WITH AUDIENCE
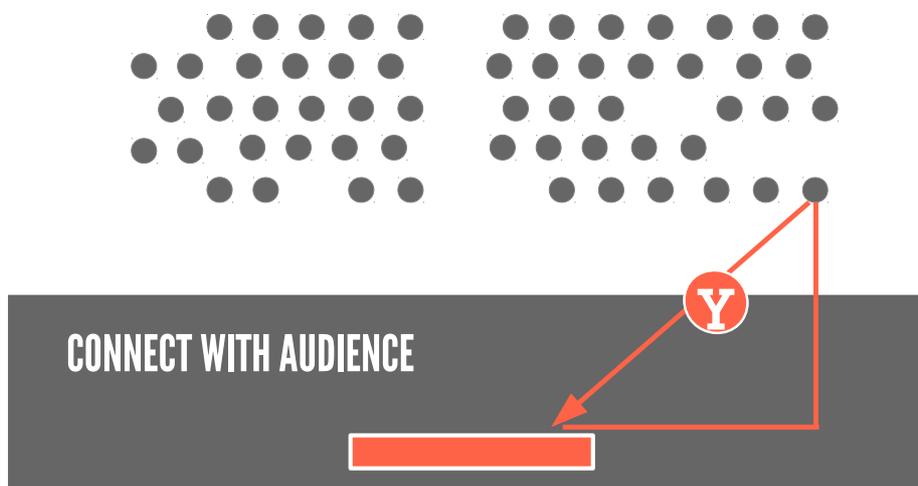
4.2.3 Gestures

The **gestures** that you can use may vary, but the three most simple and most effective gestures are:

1. the **"Give"** is used to give the audience the facts or the options. Remember to keep your palms upward when performing the Give.
2. the **"Show"** is used to illustrate and can take any form, *limited by your imagination* only. Be sure to match the gesture with the message !
3. the **"Chop"** is used to deliver a strong opinion or delineate action points. The Chop can be done with either one hand, in serial, or two hands at the same time.

People do not like exaggerated gestures. These are mainly gestures that go outside of the **body rectangle**, which lies roughly between your shoulders and your hips. Try to keep your average gestures within this rectangle. If you REALLY need to put emphasis on something, allowing the gesture to (occasionally) go outside the rectangle, will make it stand out even more ! Try to be conservative with these gestures.

> **Do not** point at your audience ! It is rude and implies an attack. Instead, use an open, extended hand (the Give). A downward-facing palm signals "quiet" or "calm down", and comes across as paternalising and dominant. Try to avoid a "stop hand", with an outward-facing palm.

4.3   Use of Voice

The voice confers both cognitive and emotional information to the audience. It is good to be aware of your own "normal" voice, just like with your personality. As with any instrument, the use of the voice can be trained.

Always try to bring your breath down to your abdomen (belly). If you stick your thumb (softly) under your ribs, and try to push it out, you are are using your belly to breathe out. This is what you should do to when speaking: use your belly to push out the air that you use to speak. Like this, you can speak louder, without it turning into screaming. Screaming is done from the top of your throat. Belly breathing takes practice and

conscious use of your voice. When done right, it makes it easier to control your voice.

Use variation in your voice to tell your story. This way, you keep the story "alive" and maintain the connection with the audience. Try to bring different tones and "colours" to your voice for different occasions in your presentation. Classically, a low voice, from deep in the chest, evokes emotions of authority and trust. Use a deep, chest-voice to emphasise a point or a "twist" in your story. Try out different tones of voice on your own, when rehearsing your presentation.

Clean up your speech. This means no loose sounds or stop words, such as "uhm...", "eh...", "ah...", "like...", "you know", "OK ?".
Add silences. Do not be afraid of a silence (or more) in your presentation. It will make your talk much more human and real. Think about it: it is the silence between the notes that actually makes certain music beautiful, just like the silence between words makes for captivating stories !

Try not to fade out at the end of the sentence. Keep the breath underneath (keep belly-breathing !) and keep the volume up, so that every word comes out understandably. Practice this. Until. All. Sentences. Come. Out. Clearly. Realise that it also has to do with insecurity. This can be overcome by going back to the basis of your story and make sure you are comfortable telling every aspect of it.

Many people are not native English speakers, yet English is the main language in science and presentations at international conferences are normally given in English. This puts non-native English speakers at a slight disadvantage. If you aware of the fact that you have an accent when you speak in English, make sure not to rush and speak clearly, so that the audience can get used to your speech. Avoid using words of which you are unsure how to pronounce them, or words that are just very difficult to pronounce in English. Rather, try to use a synonym for such words, that sound simpler. Point at key concepts, while you talk about them, to make the audience get used to the way you pronounce them.

> When you first introduce key words and/or concepts in your presentation, simply point at the word while you pronounce it (with your accent)

Repetition is very important to make the audience remember your story:

- tell them what you are going to tell them
- tell them
- tell them what you just told them

It may seem silly, but it works ! This is especially important during the Results and Discussion sections.

4.4   Questions

People are generally nervous about getting questions, fearing they will be scrutinised in public. Relax ! Questions mean that people have been listening and are actually interested in your story.
One trick is to generate questions in your talk. Leave out little pieces of detailed information, or leave an obvious question that is indirectly connected to your work. People will pick up those loose ends and ask those questions. This works both ways: (1) you can reasonably anticipate such questions, so you feel more at ease and (2) the person feels good about a asking a question that you can answered. The audience is much more willing to engage in a conversational experience, rather than just having to absorb your monologue story.

Remember to react friendly to people who ask questions. It is their profession as a scientist (and yours too !) to engage in question-and-answer sessions. It is always a good idea to repeat the question, so that the entire audience can hear it.

If you do not know the answer, be honest about it. There is no shame in admitting: "That is a good question, but I do not know the answer". Alternatively, you may propose to discuss the question after the session.

Do the same if people try to have a discussion with you "over the audience". Thank them and propose to discuss the question after the session, so that others have the opportunity to ask questions.

5. Friday

5.1 Conference

During the conference, all students will give a presentation of ca. 10 minutes, in which they will incorporate all that has been learned during the course. The presentation should contain at least a Title slide, an introduction, some findings/results using graphs and/or figures and a conclusion. The presentation consists of at least 5 slides, or 1 poster, which will be presented in an effective and attractive manner, following all the guidelines taught in this course.

An important part of the conference, is that each presenter will be evaluated by their peers. Use the forms handed out by the instructor(s), to evaluate each of your fellow students during the end-of-course conference.
Give an overall score for the talk, but be constructive ! Try to always mention (at least) three points that you really liked about the presentation, and three points (s)he could improve. Do this for both the visuals / content and the delivery (voice and body).

5.2 Evaluation

Thank you very much for participating in the course. We hope you have enjoyed it and that you have learned a lot ! Please help us to keep improving the course by filling out the **Evaluation Form** on the following web address:

https://drive.google.com/open?id=17a32zFD7uJQSYuWfN-8dVaPIDG_Qb3k2gQPit-qKe_8

Suggested reading

Alley, M. (2013) The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors to Avoid. ISBN 978-1-4419-8278-0, DOI 10.1007/978-1-4419-8279-7

Callen, J.D. (2014) Preparation of Effective Scientific Talks. Presentation Univ. of Wisconsin-Madison

Conrad, J. (2005) How to Write and Give a Good Scientific Talk. WISC meeting

Duarte, N. (2008) slide:ology – the art and science of creating great presentations. ISBN: 978-0-596-52234-6

Medina, J.J. (2008) Brain Rules: 12 principles for surviving and thriving at work, home and school. ISBN-13: 978-0-9797777-4-5

Ragupathi K. (2013) Preparing an Effective Scientific Presentation. Centre for Development of Teaching and Learning (CDTL), National University of Singapore.

Reynolds, G. (2010) Presentation Zen Design: Simple design principles and techniques to enhance your presentations. ISBN-13: 978-0-321-66879-0

Ross et al. (2007) Giving a Good Scientific Presentation. ASP Education Comittee

Schultz, D.M. (2010) A university laboratory course to improve scientific communication skills. Bulletin of the American Meteorological Society. DOI:10.1175/2010BAMS3037.1