Guidelines oral presentation

An important aim of the Biology curriculum is to prepare you for a (scientific) career. In order to do so, it is not only important to be able to plan and perform experiments, but also to communicate with others about these experiments and your results. Besides communication in the form of writing, verbal communication is of utmost importance. After a good and structured scientific presentation your audience understands:

- the aim of your research and why this is important within your field
- what kind of experiments you performed to accomplish your aim
- the implications of your results within your field of research

The skill to present a topic in a well-structured way is of benefit to you in the world of research, but also outside of academia, for example during job interviews and everyday life.

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Prior to preparing a presentation

Prior to preparing your presentation there are some important factors to keep in mind.

Structure

In order to be able to transfer knowledge onto your audience, the structure of your presentation is key. Before structuring, all data needs to be collected and analysed, results should be visualised (drawings, graphs, tables) and conclusions should be drawn.

After collecting all the necessary information, you should start with formulating the take home message(s) of the presentation. What do you really want your audience to remember? Based on the take home message(s) of the presentation the information can be selected that is required to convey this message. Be selective; not all your results or conclusions have to be included in the presentation. Only present the parts of the materials and methods, results and conclusions that will help you explain your take home message(s) and will help your audience understand the aim of your research. If certain information makes your presentation unnecessarily difficult or if it distracts from your take home message(s), you can consider to leave it out of your presentation. This could mean leaving out parts of your research that you would normally include in a report or laboratory notebook.

At the same time it is important to adjust the selection of information to the time that is allocated for the presentation, thus in a longer presentation more information (such as results, depth of introduction and discussion) can be conveyed, while one must be very selective in which data to present in a short presentation.

The structure of the presentation should aim to convey the take home message(s) in a logical and coherent way. Note that the presentation does not have to follow the chronological order in which the research was performed. Organise your subtopics in an order that makes sense.

Transitions
The content of the presentation will already ask a lot of the concentration of your audience, which makes it difficult for them to understand the structure of your presentation if you do not support them in doing so. Therefore, it is important to explain the order of your subtopics at the end of the Introduction (see **Content of your presentation**) and to present clear transitions when you switch from one subtopic to another. This way your audience knows when one part ends and another one starts. It is important that these transitions link the different subtopics.

- Incorrect: “this was *topic A*, now I will move on to *topic B*”,

Preferably address the relation between *topic A* and *topic B*

- Correct: “As we saw a clear difference in plant diversity (*topic A*), we decided to investigate/show which plant species show a clear preference, occurring only in one or the other habitat type (*topic B*).

If the structure of the presentation is logical, this will also help you drawing up the transitions between subtopics.

Clarity
As mentioned earlier, it is difficult for your audience to focus on things (e.g. the structure of the presentation) other than the content of the presentation. Be aware that unlike in a report, your audience cannot ‘reread’ an explanation during a presentation. Therefore, the clarity of your talk is important. You can lose your audience by referring to previous statements, figures and abbreviations; does your audience still remember what they were? Even if you explained in your Materials and Methods what the ‘dose A’, and the ‘dose B’ were, you cannot expect your audience to know the exact difference between them later on. Instead of these kind of references, try to refer to your experiments, treatments and sites in a way that holds relevant information, such as what the experiment was about or the actual height of the ‘dose A’ and ‘dose B’ that you used. If you showed an (schematic) image of your experimental set-up during the Materials and Methods, you can also support your audience by using that same image as a reminder on the different aspects of your experiment during later sections. You can do so by projecting the image in the bottom right corner and by keeping your audience updated about which part (e.g. treatment) of the image you are currently discussing.

Language

Unlike with papers where you do not necessarily know who will read it, you can have a good idea of what kind of audience will attend your presentation. Therefore you can and should adjust the level of your presentation and the language you use to your audience.

During a scientific presentation, consider the following instructions on the language in your speech and on your slide:

a) Do not use telegram style in speech, but do use limited words on slides.
b) Be cautious of using informal or non-scientific words that you would use in a normal conversation. Metaphors are a helpful tool in explaining matter and can be used if they add to the clarity of the presentation, but they should be an addition to and never a replacement of the explanation of actual processes and mechanisms.
c) The use of (standard) abbreviations should be limited in speech and on slides. When you really want to use an abbreviation, make sure that your audience either has knowledge of the abbreviation beforehand or make sure you address the meaning of the abbreviation more than once to make sure that your audience memorises it. The first time that you use an abbreviation you should show the word(s) in full and add the abbreviation behind it between brackets on your slide.
d) Only use numbers (1, 2, 3, etc.) on your slide when followed by a unit (mg, mM, etc). In other cases, numbers are written as words (one, two, three). Always leave a space between numbers and units and use decimals (0.5) rather than fractions (½).

e) Scientific names of organisms are always written in italics, for example: *Escherichia coli* (note that the genus name always starts with an upper case letter and the species name with a lower case letter).

Use of verb tenses

For the correct use of verb tenses, you can use the 'guidelines for written reports' which is available at www.science.ru.nl/biologyskills.

Slides and Layout

Rules on layout for a presentation are less strict than for a report (leaving more room for creativity). However, layout should never be a distraction. Therefore, it is important to keep a few things in mind:

a) Limit the number of words per line and the amount of lines per slide (a maximum of 5-7). Additionally, use short, bulleted points. Do not use entire sentences (the only exception is when you use a literal quote of someone). A few keywords per line is sufficient in most cases.
b) Stick to one style (background, colour scheme) that is not too busy. Use easily visible colour combinations with enough contrast. You can always test how your colour combinations work out when projected on a screen in a lecture room before the actual presentations start.
c) Be careful with the outer margins of a slide. Some parts may fall outside the screen when projected. Additionally, do not use the bottom 10% of your slides, as they might not be visible for people in the back of the room.
d) Use fonts that are easily readable. Calibri, Arial and Helvetica are examples of good fonts. Make sure to pick a font size that is large enough to read from the back of the room.
e) Think of ways to visualise difficult information rather than putting down text. This will deepen your audience's understanding and makes it easier to remember the difficult information. Think of pathways or flow charts were applicable.
f) Make sure that your illustrations are easily-interpretable and that the essential elements are indicated
g) Figures: although graph titles are not used in reports, they are fine on a slide. When copying a graph from Excel or Word, make sure to enlarge the fonts to improve the readability. Additionally, make sure that the differences between different lines and symbols in a graph are easily visible.

Besides these points, it is important to keep in mind that your audience will read all the information that is available to them. Therefore it is important to synchronise the information in your talk with the appearance of information on your slides instead of showing all the information on a slide at once. This can be done by using the animation type 'appear' in PowerPoint for both text and images. If an image is not relevant anymore, you can prevent it from becoming a distraction by removing it (using 'disappear'). By using animations in this way it can also support you as a presenter, as it can help you to prompt what you are going to tell next. However, do not use distracting types of animations (e.g. animations that move around). In your results section, you could consider to use separate animations for different data points within your figures, or to use arrows that appear at the part of a graph that you are talking about.

Doing so can help you to guide your audience's attention, but always keep in mind that this may also form a distraction when you use it too much.

Plagiarism

A scientific presentation usually contains peer reviewed sources, such as Web of Science, PubMed or Google Scholar. Presenting conclusions and/or results from the work of others, without proper citation, is considered plagiarism. Plagiarism will always be reported to the Examination Board, after which they decide what penalty will follow.

However, the rules on citing other publications are less straightforward in presentations than they are in written reports. As a guideline for using literature and citing you can use the following rules of thumb:

Slides

- Copying complete sentences from literature or digital sources is also considered plagiarism, even when adding a reference! Always put the information you find in your own words and make sure to limit the number of words per line.
- If you however want to use a literal quote, put the quote between quotation marks ("……") together with the name of the author.
- If a bulleted point is based on literature, place the name of the authors and year of the publication between brackets at the end of the bulleted point, e.g. (Watson and Crick, 1953) or (Randall *et al.,* 2002). Write down the full citation in the 'notes' field associated with the slide.
- Place references of images you use from external sources below the image (small font) or in the 'notes'.

Verbal presentation

- Here, referencing is less strict. When you make extensive use of a source you can name the authors, otherwise a phrase such as 'literature states that…' will suffice.
- In some cases mentioning the source of your information is beneficial to your story. For instance, if your research is important because of certain legislation, it can help to refer to this legislation and the corresponding authority.

Content of your presentation

- **Opening and Title slide**
- **Introduction**
- **Body**
- **Conclusions and Close**
- **Questions**

Opening and Title slide

The first and last few sentences of your presentation might be the most important ones. They offer you the opportunity to grab your audience's attention with just a few words. Therefore, use an attention grabber during your opening to engage your audience. A good attention grabber is one that is relevant to your presentation and will create a need for your research, while being appealing to your audience. It can be as simple as mentioning the problem that you are addressing in your research. Starting a presentation by stating your name and the title of your research might be relevant, but is not appealing (there is time to introduce yourself later). Examples of attention grabbers are quotes, questions, anecdotes, a statement or a picture. It is possible to create a separate slide for your attention grabber.

Your Title slide contains some general information and concludes your opening before moving on to the Introduction. The top of this slide will contain your title (in a big font). Other information that belongs on a Title slide is the date, your name(s), student number(s) and the name of your supervisor (if you had one). If you have a nice picture of your project, you can place it on this slide as well. While showing the title slide, briefly introduce yourself and your topic.

Introduction

The introduction of a presentation is similar to the one in a report. Provide relevant background information to your work in a funnel shaped order; start by putting it in a broader context and narrow it down along the way. Include all the information that your audience needs in order to understand your work. During the introduction you will elaborate on the context of your work, the relevance, your aim / research question and your hypothesis. Be concise and unambiguous. Note that part of the context or relevance can already be included in your attention grabber. Conclude your introduction with a preview on the structure of the body. This preview will show your audience in what order you will go through different topics. This does not merely encompass stating the structure of your body, but also the logic behind that structure. The order of 'Materials and Methods – Results – Discussion' is considered to be known to scientific audiences. So you do not have to focus on explaining that you will move on to the Result section after the Materials and Methods, but rather focus on the order of the scientific content that you will address.

Incorrect: “After my Materials and Methods section I will move on to the Results section”.

Correct: "First I will discuss the most notable RNA expression differences between skin and limbal stem cells. Since the epigenome is driving transcription, next I will discuss which epigenetic marks and cis-regulatory regions highly correlate with the identified expression differences. Finally using the identified cis-regulatory regions and motif enrichment, we can uncover which Transcription Factors are driving the differences between these cell types."

Body

The body of your presentation consists of your Materials and Methods, Results and Discussion. It is important to decide how you want to structure your body. You can choose the same structure that is used in a report, where the Materials and Methods, Results and Discussion are separate blocks. In that case you will finish the entire Materials and Methods section before moving on to the Results and finish the Results before starting with the Discussion. Especially if your research consists of multiple parts, another option could be to use your subtopics as the main building blocks of your body; you will address the Materials and Methods, Results and Discussion of topic ‘A’, before moving on to the Materials and Methods, Results and Discussion of topic ‘B’. This way, when you are finished talking about the results of a graph, you can start discussing those results in relation to other results and literature while the graph is still shown on your slide. This can help your audience to better remember what your results were when you start to discuss them. A downside of this option could be that the different topics feel less connected to each other, so make sure that you create logical transitions between the topics and that you link the different parts of your research when discussing them. It is also possible to use an intermediate structure or a completely different one. Most important is to consider what structure will make your story the easiest to comprehend.

Materials and Methods
This section should describe in a concise way how the experiment(s) were conducted, with less details than in a report. Your audience should be able to understand what you did, why you did it and how the experiments are suited to answer your research questions. However, your audience does not have to be able to perform the experiment themselves based on your presentation. Keep in mind that you should be able to elaborate on the methods if you get questions about it at the end of the presentation.

Where applicable you can use pictures or schematic images to show them what you have done. A schematic image can be especially helpful when explaining your experimental setup. If this is not yet addressed in your Introduction, explain why you picked a certain model organism / study site / etc. Explain the methods that you used to measure your parameters and mention the sample sizes you used. Additionally, mention the different statistical analyses that you performed and explain how they fit your data sets.

If you are presenting work of others instead of your own (i.e. one or more published articles from other authors), your Materials and Methods section can consist of two parts:

- How did you find and select the articles that you are using in your presentation (assuming that you had to look for these articles yourself)?

- What were the methods that were used in the articles that you are discussing?

Results
The Results section of a presentation is similar to that of a report. You will present your results using figures (graphs or drawings) and tables. Try to use figures where possible as they are faster to interpret than tables. Before discussing a figure or table, remind your audience of the corresponding hypotheses. Afterwards, guide your audience through your figure/table. Remember that your audience has no clue what you are going to show them, so take your time explaining it; explain the variable on the x- and y-axis and explain what the different lines/columns/colours mean before you move on to pointing out the relevant patterns and differences that you found in your experiment.

It is easy to just copy paste your figures/tables from your report, but often it is beneficial to spend some extra time on them. A figure/table that is used in a presentation needs to be as easily comprehensible as possible. Make sure that the important information in your graphs catches the eye. Furthermore, follow the tips as mentioned in '**Slides and Layout**'

Discussion
The Discussion section of a presentation is similar to that of a report. The discussion of your results is perhaps the most important part of your presentation, as this is the section where everything comes together (the different experiments, their results and their implications). Use the main conclusions that are drawn from your results by integrating them with each other and with results from literature, and discuss how this relates to your aim and hypotheses. If your results are unexpected, try to use literature to find an explanation for the unexpected outcome. Explain the relevance of the outcomes of your work to your field of research (and society). Does it fill up a knowledge gap, create new insights or does it confirm/refute other published work?

Conclusion and Close

During the Conclusion you will give a concise summary of your conclusions, while linking these to your research question / aim and your hypothesis. Additionally, these conclusions should clearly show the relevance of your work. If your Discussion led to certain knowledge gaps, this is also the place where you could suggest a follow up study. In your Conclusion, either create a coherent story with logical transitions between the different conclusions or list the conclusions one by one.

At the end of your Conclusion you will work towards your Close. A strong Close is one of the things your audience will remember from your presentation. There are several ways to end your presentation.

Incorrect: "This was all I prepared"

OK: "This was my presentation, are there any questions?" or "Thank you for your attention"

However, these ends do not really make an impression on your audience. Announcing the end of your presentation is not the most subtle end. The strongest way to end your presentation is with a sentence that actually creates an end to your presentation, without you telling your audience that it is the end.

Depending on the rest of your presentation the best way to do so could be to return to your attention grabber. Either repeat your Opening, finish it or answer it (if it was a question). By returning to your first sentences you can show your audience that the circle of your information is completed and thus your presentation is at an end.

Better: "At the start of my presentation I asked the question which transcription factors are driving the differences between skin stem cells and limbal stem cells. After our multi-omics analysis we found the most important transcription factor driving the limbal stem cell fate is PAX6, using this knowledge in regenerative medicine might uncover new treatment options for patients with limbal stem cell deficiency."

Questions

In most cases there will be time for some questions after your Close. Prepare answers for questions that you expect. As you cannot tell every detail during your presentation, make sure that you still remember the things that you deliberately omitted from your presentation during the information selection. You could create 2-3 extra slides at the end that help you answer some expected questions. When answering questions keep the following things in mind:

- When responding to someone with a soft voice, repeat the question to make sure that your entire audience knows what the question was. By summarising the question you can also check with the person whom asked the question that you fully understand what was asked.
- Listen to the entire question before answering. And when you answer, make sure you are talking to the entire audience and not just to the person asking the question.
- If you are not completely sure about what the question was, you can always ask them to repeat or rephrase their question.
- If you do not immediately know the answer, take your time and think about it for a few seconds.
- If you do not know the answer to a question, or if you are not completely sure about it, try to formulate a hypothesis (based on literature) and explain why you think this could be the answer. This way you can show that you are able to think on an academic level even if you do not know the answer. If you are not sure of an answer, do not pretend that you are. If you end up to being wrong, this will harm the credibility of your presentation. Let the audience know that you are not completely sure, but that your hypothesis is ….. , because of ….. **.** Always support your hypothesis with reasons why this hypothesis could be correct (or in which cases it could be wrong). If there is no straightforward answer, another option is to show the different sides or viewpoints that are possible.

Rehearsing and delivery

Preparation

Practise your presentation a few times until you feel familiar with it. If you want feedback on your presentation, practise it with a group or record it and watch it yourself. However, be careful with an over rehearsed presentation, as this could lead to a less spontaneous delivery and limits flexibility. When you keep forgetting a certain detail in your presentation, add an extra image or a bullet point in your slideshow that can prompt you when to tell that detail. In doing so, your slides can help you to memorise your story. It is advisable to fine-tune your presentation every time after rehearsing.

When practising your presentation, check if it is in line with the duration that is available and adjust the amount of information in your presentation accordingly. Often presenters put too much information on their slides and in their talk. For your audience this can lead to an overload of information, which makes it more difficult to understand the take home message. Therefore, do not be afraid to cut in your information load after practising, and do not make a correction by speaking faster.

Note, when you prepared your slides on your own laptop or computer, make sure that your presentation works on the computers at the university.

Presenting and (non-)verbal communication

This section forms a guideline for the delivery of your presentation. However, the way you want to prepare and execute your presentation can differ per person. Therefore, read it for what it is; a guideline and not a set of rules. Use them to improve your presentation, but also find a style that suits you and that you feel most comfortable with. If you really want to improve your delivery, try to pay special attention when you attend a presentation of a lecturer or a fellow student. Unlike asking for feedback on your own presentation, getting feedback from watching other peoples' presentations is something you can do almost every day. What do you like or dislike in their presentation? Pay attention to how they use their PowerPoint, their pointer, the rate at which they speak. Do they use a pause at certain points in sentences? Are the pauses deliberate or is the presenter searching for words? Are these pauses well timed or inconvenient? Do the speaking rate and (lack of) pauses give you a relaxed feeling, or do you feel rushed? How is their posture and use of gestures? When looking at others, be aware of the following two questions that can help you improve your own presentation skills:

1. What are other presenters doing that you could incorporate in your own presentations?
2. Are there things that other presenters are doing that you dislike, but that you might be doing yourself as well?

Verbal communication
Your verbal communication is an important part of how your presentation is received. Keep the following points in mind:

- Try not to speak too fast, as this will heighten the information load of your presentation, which will make your presentation difficult to follow. You can help yourself in doing so by not jamming too much information in your presentation. When speaking slower, it is also easier to clearly pronounce words. However, also beware of not speaking too slowly.
- Pauses can be used to emphasize the words that follow the pause and give your audience the chance to process the information you just presented them with.
- Give yourself the feeling that you are talking to the people at the back of the room. This way everyone should be able to hear you. If you are talking towards your slides or towards people on the first row, it is difficult for the people in the back to hear you.
- Try to find out if you have any distracting fillers by practising your presentation with a group or by recording yourself. If you are aware of such fillers, you can try to limit the use of them if they are considered to be distracting.
- You do not have to read your slides to your audience. They will read them anyway.

Non-verbal communication
Your posture, gestures and eye contact are all important factors in your non-verbal communication. Your non-verbal communication can support your story or distract from it.

- By looking at people you can give them the feeling that they are involved. Do not just stare at one person, but scan the room. Looking at the ground can make you seem indifferent or bored and looking at your slides will make you hard to hear. Using notes will also limit the amount of eye contact that you can have with your audience.
- Breathe towards your belly. This will make you feel more relaxed, and can help you achieve a calm strong voice. Breathing towards your chest will make your voice weaker and more rushed.
- Keep your back straight and your shoulders down. This will release some tension from your body and makes you seem more relaxed. By standing straight it is easier to breathe towards your belly. Furthermore, a more confident stance will unconsciously make you feel more confident. If you are not sure if your shoulders are in a relaxed position, lift them up and let them fall down. This way they will end up in the right position.
- Plant your feet apart at about shoulder width and distribute your weight evenly on each foot. This will prevent you from wobbling too much.
- The use of your hands is very important during your presentation. Leave your hands at your sides or clasp them together in front of you. When you have your hands in front of you they are ready when you want to use gestures. Do not cross your arms or put your hands in your pockets, as this will make you seem bored. Putting them behind your back can give you an air of authority, which is not necessarily positive. Do not use your hands to fumble your hair or your jewellery. If you are afraid that you might do so, remove that piece of jewellery.

- Gestures can be used to emphasize important words, a start, an ending or a transition. They will make your presentation more dynamic and can keep your hands from doing other things. However, keep a balance. Overusing gestures can make you appear nervous or chaotic.
- Know where you want to stand during your presentation. Do not stand directly in front of your slides, as this will limit your audience's view. Additionally, this will result in you standing with your back towards your audience if you want to point out something on your slide.
- Use the pointer to indicate what part of a figure you are talking about.

Nerves

A lot of presenters are struggling with their nerves before and during their presentations. Although a bit of stress can help you perform, too much of it can have a negative impact. Note that although it is not always obvious, every speaker has nerves. Furthermore, the shaking hands and vibrating voice are a lot more obvious to you than it is to your audience, so try not to be overly concerned about it. Your mind-set can have a large impact on your stress level. Try to think positively and ignore negative thoughts. Affirm yourself that you are relaxed, confident and that you can do this. Even if you do not believe it, it will have a more positive effect than doing the opposite. The realisation that you are feeling stressed can often make you more insecure and thus extra stressed. The previous tips can also help you out; realize that everyone is stressed and try to stay as positive as you can. Realize that stress caused by excitement can feel quite similar to stress caused by anxiety, the feeling is not necessarily a bad one. You could even tell (or lie to) yourself that you are excited to do your presentation. A few tips on breathing and posture that can help to be more relaxed are listed at 'non-verbal communication' above.

Another way to cope with your stress is to limit uncertainty. Make sure that you are well prepared. If you tend to forget what you have to say, create PowerPoint slides that help you cue what you have to say. If there are parts of the presentation that you tend to forget during rehearsals, tweak that part of your slide until it fully supports you. If you still do not feel secure about it you can always bring some backup notes. Try not to use these notes from the beginning. Place them on a table, so that you can reach them in case they are really necessary. Do realize that your audience does not know what you want to tell them during your presentation. Even if you forget a piece of information, it is not likely that your audience will notice this.