

Guidelines for the Preparation of Scientific Presentations

This is a short compendium of guidelines for how to prepare scientific talks.

There are basically two types of scientific talks:

1. Talks in which you talk about your own work. These are research talks in group meetings, in advanced seminars or at conferences, for instance.
2. Talk in which you talk about other people's work. These are talk in regular teaching seminars and journal clubs, for instance.

In addition, a scientific talk can be supplemented with a written paper. In the case of a seminar talk, this is the seminar paper. In the case of a conference talk, this is the conference paper. If written material is involved, the written and oral parts have to closely relate to each other.

In this set of guidelines, there will be a certain emphasis on seminar talks. The guidelines apply to the other kinds of talks, as well, but quite a few of the remarks are irrelevant or have to be modified in these more general settings.

Seminar talks serve to

1. Learn the techniques of independent digestion and presentation of non-trivial technical material. (This is of benefit to the speaker.)
2. Help the audience quickly grasp the essentials of the digested material. In essence, the audience should benefit from the work of the speaker in that they do not need to spend as much time on digesting the presented material. (This is of benefit to the audience.)
3. Getting the seminar credit

Especially inexperienced speakers often largely disregard the second purpose of a seminar talk.

The main consequences of the above observations are

For the speaker: It is not the only purpose of the talk to convince the professor that you have understood the material. Rather the main purpose is to transfer your knowledge to the audience. In seminar talks, you must be prepared for me to interject, when I sense that you did not get the point across to the audience (or to me).

For the audience: It is no sign of politeness but rather of timidity, lack of interest or wrongly understood solidarity with the speaker to not ask questions if you feel that you missed an important point in the talk. Ask right away! Because if you do not do so, you will not be able to follow as the talk continues. Your question is also a help to the speaker, because he can adapt his presentation to the audience better, if he gets feedback. Of course, in certain formal settings, such as at conference, questions during the talk are excluded.

Phases of preparation and deliverance of a talk

There are basically three phases of preparing and holding a talk:

1. **Digest and organize the information:** In general, the references that you get for preparing a seminar talk are not complete. You have to augment them by your own literature search. (In journal clubs people typically talk about a single paper but may have to delve into some of the secondary literature.) Your understanding of the material must be deep enough
 - make a judicious selection of the subset of the material that you will present in writing and orally (not necessarily the same!)
 - answer questions which transcend the material that you present orally, as long as they pertain to your written material or the literature that you have read.

Thus it is safer to accumulate a certain buffer of additional information beyond what you are presenting.

2. **Prepare the written material:** The paper should be about 10-15 pages long. In general, even when your literature is excellent (textbooks and review papers are often better prepared than original research contributions), it is not advisable to directly transfer text from your sources. Rather you must reorganize and condense the material. The selection of what you are going to present is critical here. If you omit details, you have to cite the literature. In general, in seminars we will make your papers available via the internet¹.
3. **Prepare the visual material for the oral presentation:** This is not identical with your paper. The written communication channel has a different character than the oral one. Written material can be reread, whereas oral material cannot be re-heard. Thus, your paper can delve into more detail and will provide much more information, in general. In contrast, the audience is supposed to follow your oral presentation in real time. The selection of what you present in your oral contributions is especially critical. Set priorities! If you overload the audience with facts, you risk that they will take home very little. In contrast fewer insights that are presented prominently, often stick much better. In your talk you are not just supposed to present your topic but, in a certain sense, you have to sell it. By this I mean that you should generate interest on the subject among the audience and motivate people to follow up on your presentation. Your talk is not supposed to present the topic in a comprehensive manner, i.e., you are allowed to leave out material in the talk that is contained in your paper and refer to your paper or the literature for this discussion. Typically omitted material will include less essential formal derivations or details of validations and, possibly, some special cases occurring in the study that you are presenting. This also means that critique on a seminar topic that claims that the topic is too voluminous is generally unfounded: You are the one to make the selection.

Where the paper is precise and formal, the oral presentation has to be intuitive and illustrative. Use examples in your talk to illustrate general principles. Use images

¹ Restricted access

rather than text. Use headlines rather than complete sentences. The paper is where strict and formal discourses belong. (If you have a very formal topic and formality is the issue of your material, of course, the talk has to be formal. But you will be surprised how much formal material can effectively be communicated pictorially.) Where your paper can have a (well organized) steady flow of information, your talk should have a limited number of highlights. Otherwise talks become monotonous and put the audience to sleep. Carefully select your highlights and work up to them. Give the audience a few easy stretches in your talk to relax and recuperate in the meantime. In short: Your talk needs a dramaturgic curve. The highlights can be organized by structuring the talk and the audience can be prepared for them by starting with a table of contents of what is to follow.

It is a good idea, in fact almost a standard, to prepare slides in PowerPoint. PDF is another variant. We will also put your slides on the internet¹ above. Here is a list of detailed suggestions for preparing the slides:

- Select a sufficiently large font. (Use the presettings of PowerPoint)
- Choose colors judiciously and consistently. Nothing is as unnerving as a slide that looks like a box of M&Ms. Note that green text colors before white background usually do not show up well on projected image.
- Only write on the slide what you will actually refer to in the talk, and keep the slides isomorphic with your oral presentation. Otherwise, while you are speaking, the audience will be distracted by reading the diverging content on your slides. Putting complex slides up only for a few seconds and not referring to their content or mention their essential point is a bad habit that is widespread. By the same token, it does not help to put up a complete formal definition that is not detailed in the talk but only illustrated intuitively. So the rule is: If you do not talk about it, do not put it on the slide.

Sometimes you cannot avoid using slides that are complex and of which you only address excerpts. In this case you should let the audience know that you do not expect them to understand the whole slide. Otherwise they will try to do so, be distracted and possibly miss important material. By the same token, if you include forward references in the talk, i.e., if you mention points that you explain in more detail later (or never), then you explicitly have to say so. Otherwise the audience will ponder what they should understand and what comes later or never, and again they will be distracted.

- The general rule used to be: If you have many more than 20 slides that you want to discuss in detail, you have too much for one hour. This has changed with animation becoming an option, since the unit of “one slide” has become fuzzy. However, take care that you employ animations in a goal-oriented and limited fashion. Be professional rather than playful (M&M effect!).

Working at the blackboard has become unfashionable though it is still quite widespread in mathematics. Still, it is important to make the point that working on the blackboard is much harder than using slides or overheads. The organization of the blackboard image has to be planned very carefully, or chaos ensues. Often, speak-

ers write on the blackboard – mostly subconsciously – more or less incoherent material like parts of sentences or unannotated figures and formulas. If the use of the blackboard is professionally done, then a blackboard talk is much easier to follow than a talk with slides. This is because on the blackboard one is limited by one's speed of writing. Figures and images should never be done on a blackboard.

4. **Give the talk:** Generally, you have a fixed amount of time for your talk (60 to 70 minutes for seminars, 45 to 60 minutes for research talks, 25 minutes for conference talks). After the talk, there is generally some time for discussion (5 minutes in conferences to 20 minutes in seminars). In some settings, questions can be asked during the talk. Practice your talk several times before you give it to get a feeling for your use of time. Running over time in a talk is a deadly sin and you may have to decide during your presentation to leave out or rearrange parts of the talk in order to get by with your time allotment. This is a normal provision that experienced speakers make. You can engage a benevolent audience for this practice session, but can also “talk to the wall”.

If you hold the talk in a language that is not your mother tongue you need to specially prepare such that your language will be understandable. During preparation, give your paper and present your talk to people that are fluent in the language of the talk. Practice your talk especially diligently and concentrate on the intelligibility of your style and diction. The object here is not stylistic details but whether you get the main points across in the language that you are speaking.

Questions that help you assess your own deliverance

1. When the participants of the seminar were asked which talk was the most exciting one, would my talk have a chance?
2. Will the audience still be able at the end of the semester to recover the main points of my talk?
3. How many participants will remember my talk in a few months?
4. How many participants would have preferred to go to the literature directly rather than listen to my talk?
5. How many questions did my talk generate? How many of them could I answer?

Concluding remarks

Participating in a seminar does not necessarily imply passing the seminar. You are not expected to make a flawless presentation, since the seminar is an occasion for you to practice giving talks. But there are a few basic deficits that stand in the way of your passing the seminar. These include:

1. Absence from the preparatory meeting with your tutor (after development of the concept of your talk and paper) and subsequent bad presentation

2. Substantial deviation from the allotted length of the talk or bad organization of the talk (i.e. the time runs out after you have given the problem presentation but before you have given the solution)
3. Paper and talk are almost identical, unless the topic suggests that and it has been checked with the tutor beforehand.
4. Severe problems with the organization of the slides or the blackboard image
5. Severe language problems in paper or talk

Do not be too apprehensive, though, as the general rule is: If you fail a seminar you might be surprised but it will be obvious to the rest of the class.

Last but not least

By accepting your seminar topic you assume your partial responsibility for the success of the whole seminar. A late cancellation of your participation (after the time that we can find a substitute) is partly a sabotage of the whole seminar and I will consider it as such, unless overriding reasons justify this act.

I hope you have fun preparing and holding your seminar talk and I ask you for your contribution to make the whole seminar a success.

Thomas Lengauer, in the spring term of 2004