Chapter 17. Research Presentations

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Research Presentations

The Importance of Presentations

Talks are important in getting your name, skills and experience known to others. In particular, a job talk should be very well done; conference papers and seminars should likewise make an impression - on other researchers, some of whom can potentially become your employer or collaborator. Unlike a journal article, a presentation is an opportunity to convey your ideas to a captive audience and at the same time to get feedback to guide your future work.

Presentation Goals

The goals of a talk are to communicate an idea and its importance. A conference presentation also serves as an advertisement for the paper to appear in the conference proceedings. A seminar tends to be more detailed, with an emphasis on discussion of the material with the audience. A job talk is similar, but should in addition also show your breadth and depth of knowledge, your interests, the viability of your research and your presentation skills. In an oral/thesis examination, one must also show understanding of the topic and clearly demonstrate one's contribution to the field. Unlike seminars, conference and job talks, it is important to ensure everyone in the audience understands everything you say in an oral examination or viva!

Choosing what to Cover

As it is not possible to fully acquaint an audience with your research work in the course of a presentation, the talk is an "appetizer" - telling enough about what you have done to make the scope and contribution of your work clear, and to stimulate interest. If the audience have understood enough and you have kindled their interest, people will follow up on the details with you afterwards. What then should this appetizer cover? Choose the material you will present according to the background and interests of your audience.

Most research involves a few new ideas and the application of standard tools and techniques. Emphasise what is novel, and omit what is well-known or complicated. Ask yourself what single thing you would like them to remember afterwards, and focus on this. This will mean that you choose one (or perhaps two) issues to relate in detail, and - out of necessity - the others are omitted entirely or just mentioned in passing.

The Structure of a Research Talk

A well-organised talk, the structure of which is given to the audience upfront, is much easier to follow than a rambling one, or one where it is uncertain where the speaker is heading. At the highest level, a talk usually comprises five man sections:

- Introduction - an informal description of the research
- Related material - an overview of relevant existing work, showing how yours fits into this framework
- Body - a more formal overview, aimed at putting across the major contribution of the work (one or perhaps two of your ideas that are novel, significant and interesting)
- Technicalities - a more detailed look at the most crucial aspect you want to put across
- Conclusion - key results and some of the evidence supporting your claims

The Introduction

Most people will decide how much attention your talk warrants and how competent a researcher you are on the basis of your introduction alone.

Grab your audience - your introduction should raise an issue, present a puzzle or ask a question (and your talk should then solve this issue, question or puzzle); this gets the attention of your audience and keeps them on track with you as you proceed.

Start with a clear and concise definition of the problem you are addressing (it is amazing how many people take some time to do this, or never do). Follow this up immediately with something to get the audience interested - how does this problem fit into the larger picture? why is it hard? what are its practical applications? Having thus said what your are tackling and why, the next question in many minds will be what is new in all this?

The audience is looking for something succinct and tangible to remember your paper by, and this must be given next - the precise contribution of your work to the discipline. Some other points you may choose to cover in the introduction are definition of any special terminology; and a brief outline of the structure of your talk.

Related Research

Before presenting your work, describe related research and how yours compares with it. To make sure your audience understands the talk, you may have to cover background material if many do not have this knowledge. It is important to remember to set the scene even when your audience is a

knowledgeable group working in your own area, such as when talking at a conference or workshop. Do not dive into detail or complex issues, as you will lose most of your audience who have not been working on this particular problem over many months or years, as you have. But remember that if you spend too much time on this you are much less likely to grab their interest in your own ideas when you eventually get around to them. Ask yourself whether each piece of background material you consider including is absolutely vital in order for them to understand the one key point you want to make. If not, don't waste their time with it. If yes, make sure you put it across as simply and quickly as you can.

The Body

Describe your key results here, working from high-level abstractions through to more complex details. Mention technical details if you wish, but do not delve into them as you will lose your audience and detract from the main point(s) you are making. Take time to explain convincingly how you have achieved what you promised in the introduction.

Keep your audience with you - repeat your outline at times, showing where you are in your talk; relate each point to the issue/puzzle/question posed at the outset; consider asking the audience questions; break up difficult material; use the well-known technique of keeping people with you: tell them what you are going to tell them, then tell them, then tell them what you told them.

Technicalities

Following on from this overview of your contribution, give the interesting detail for one, or perhaps two, key ideas. This helps the non-expert to understand what is involved behind the scenes, and gives the expert something to think about and hopefully learn from.

The Conclusion

Having described your research, you can now make observations, present strengths and weaknesses, discuss experimental results, and mention questions, extensions, generalisations or alternatives that you believe warrant future study. Try to wrap up in such a way that both experts and non-experts are shown what they should take away from the talk. When you have finished and checked that there isn't an undue amount of time remaining, state clearly that you are done by saying something like "Thank you. Are there any questions?"

Knowing Your Audience

Know your audience - what knowledge do they have in your subject area? Is their background largely mixed, or more or less uniform? Do they share your views? Do they share your assumptions?

If your audience has relatively little Computer Science knowledge, you will spend more time on your introduction and background, and omit the technicalities altogether. That is, you will take more time to describe the problem, where it occurs in practice, why it is hard to solve, current thinking, and the underlying concepts and terminology you will be referring to in your talk. If your audience comprises Computer Scientists, then the more they know about your field, the more you can shorten the introduction and background, focus on the body and increase the section on technicalities. If you address experts in your field, devote most of your time to the body and technicalities, and take extra care throughout to convince them of the soundness and accuracy of your claims and your results.

Illustrating Ideas with Examples

It is well known that examples are vital, but choose those that illustrate why you have developed your solution/language/model/architecture/theory, not those that look most impressive or illustrate as many details as possible. It is no help to you if your examples are mind-boggling and leave you audience wondering what the benefit of your research is. The main criterion to consider when choosing your examples, is do they accentuate the point you are trying to make. Do they bring home the practical advantages of your idea? Are they the examples that motivated your tackling the specific problem/

task in the first place? Do they illustrate the single thing you wanted your audience to remember after your talk?

Mention Problems and Concerns

Be honest with your audience, otherwise you will have gone to a great deal of effort without gaining much. If you have concerns, voice them. If there are problems you have not yet solved, or don't know how to solve, mention them. After all, this is a research talk, and you are meant to challenge and stimulate thought in your audience. If you hide your concerns, you will not learn from the advice, experience, different perspectives and ideas of your audience; a rare and valuable opportunity will be lost, possibly forever. And the fact that you are skirting the difficult issues will show - either directly visible as a reluctance to discuss certain aspects, or else leaving the overall impression of a poor talk that missed out the interesting details. Talking about your problems takes courage, but if your worst fears turn out to be valid and your concerns truly require a change in research direction, then it is far better to find this out immediately and at your own initiative. More usually, you will find that your audience finds a solution for you, or points you in a direction that will lead you there, and that the interest generated by your paper stems mainly from precisely those problems you were reluctant to mention.

Preparing Slides for a Presentation

Limit the Text on Slides

Once you have decided what your talk will cover, make sure that your slides support the talk, and no more. Do not write all or most of what you will say on your slides. Use short points rather than whole sentences. Reading to the audience is very boring and frustrating, particularly as they read faster than you can speak. Slides are essentially cues/prompts for yourself, and notes for your audience of what they should be remembering. You should spend far longer discussing issues on a slide than it takes to read through that slide. Keep the amount of information on a slide to a minimum, and talk about this.

How Many Slides are Needed?

Beware of preparing too many slides and rushing through them. With practice you will learn how many slides you typically use per ten minutes of presentation (a rule of thumb is around 2 minutes per slide, but this is very much dependent on your personal style), and you will begin to naturally produce about the right number of slides.

From time to time, a slide containing only the title of the next section gives the audience something to hang things onto as they hear them, and avoids the distraction of wondering where you are heading.

Usually it is advisable to make a few extra slides in case you finish your talk much too early (a little early is no problem, just stop after what you prepared). Many people also prepare extra slides for questions they anticipate - e.g. graphs or tables of results, or diagrams showing system/solution parts in more detail.

Visually Appealing Slides

Be visual - after your talk outline and your statements of the main points you want to make, try to have a picture on most of your slides. Make the words on your slides readable - few words, large fonts. Enhance your slides with colour, but do so for a reason (to show emphasis, alternatives, timing, etc.) and avoid using such a variety that you resort to shades like yellow that are hard to see.

Do not show code (unless your talk is on a new language) or maths if you can avoid it. Use examples as much as possible, and make sure they are at the right level of detail. . It is true that "a picture is worth a thousand words", but diagrams must nonetheless be carefully explained (do not, e.g., say vaguely that "our results look like this" or "here is an example using our model").

Powerpoint vs Hand-Written Slides

Powerpoint slides has been the norm at conferences for some time, enhanced with photographs, video or other media where the paper requires this. But if you are making a presentation in your own department or to your own research group, think carefully about using hand-written transparencies instead. What you want is feedback on your ideas, not to impress or distract the audience with effects; and the simpler your slides the more they will focus where you want them to. If you feel uncomfortable about "breaking the mould", sound out your supervisor or a colleague; you will find they are far more likely to welcome this than to object.

It is quicker and easier to write your text and draw your examples manually. You can also add to them or change them during your talk. Using PowerPoint you will spend much time configuring the visual appearance and special effects - time that would be better spent on the content. You will be more reluctant to omit a slide (that you should not be wasting the audience's time on) for this very reason, and can also be tempted to include too much on a slide by using a small font (e.g. code, complex diagrams and tables, too much text, etc.) Naturally you can still include transparencies made from figures you already have in convenient electronic format. Special PowerPoint effects are not vital - they essentially allow for emphasizing and timing display components, which is still possible with transparencies through appropriate use of colour or overlays.

With hand-written slides, be sure to use permanent ink projector pens, and to replace the backing sheets with ordinary paper that does not cling to the transparency. Add brief notes to these backing sheets where necessary to remind yourself of points you forgot to make when rehearsing, details that are hard to remember (like numbers or names), time checkpoints, and so on. If your personal preference, or that of your department, is to use PowerPoint, at least consider this alternative seriously first.

Preparing for a Presentation

To present your research to an audience requires good planning and delivery. Part of the preparation for a talk is thus concerned with polishing the delivery.

It is easier to present you own work if you already have experience delivering talks on other material. Practice public speaking by offering to present a paper you have read at a reading group session or research group meeting. If this is not normal practice in your department and there is no interest in starting such an initiative, offer to present a seminar on your literature review; this gives you practice in giving a talk without having to worry about the quality of the content.

Irrespective of the experience of the speaker, any presentation can go either more or less smoothly depending on the amount of preparation put in - beforehand and on the day of the talk. This effort is sketched in the two sections that followed.

Advance Preparation

If there is a tendency in your community to boast about how casually and quickly one's talk or slides were produced, ignore this completely! It is absolutely vital to prepare a talk thoroughly beforehand. Take time to draft slides, obtain feedback, and improve them until you are satisfied with what they cover and how. Decide exactly what you are going to say, slide by slide as well as between slides, and rehearse this until you have the entire talk in your mind. Though the slides will be there to guide you, a polished talk is always easier on the audience; while the confidence of knowing that you are well-prepared will do wonders for your voice and delivery. Remember it is obvious to an audience if a talk is not well-rehearsed, and this can lead to individuals being more aggressive and attacking than they otherwise would have been.

Time yourself to make sure that you remain within the limit set. Have a few checkpoints e.g. half-time and three-quarter-time points so you can adjust your pace if necessary. Practice the start and the end especially well, as these have the major impact. Give a trial talk before an audience of friends and colleagues first wherever possible, asking them to ask you hard questions.

Try to use the same presentation method as others in the community, but if you must use different equipment, then make sure you arrange this with the organizers in advance. Whatever format you are using, take along backup copies of your slides in case of problems.

Preparation on the Day

On the day of the talk, do not dress inappropriately. If you are too formally or too casually dressed for the occasion (depending whether it is an academic talk or a formal interview, respectively) this will not inspire confidence in you. Also avoid clothes that distract your audience because they are revealing, or too colourful, or the like.

Arrive early at the venue and make sure that the equipment you need for your talk exists and works as you expect, by physically trying it out well before it is time for your presentation. If your venue requires that you use a microphone, watch how previous speakers use this (if any) and attach it to your clothing with the help of the organizer or session chair. It is generally best to attach a microphone to your collar or some other part of our clothing as near to your face as possible. This can be hard to do, and if it falls or is clumsily handled, the amplified noise can be very unpleasant, so find out how to switch if off while you are attaching it. And if you are inclined to gesture while you talk, be mindful that you don't dislodge your microphone because of the noise and the loss of time, confidence and concentration.

Delivering the Talk

How to Talk about your Slides

In any presentation, try as best you can to speak naturally, as you would if conversing with a friend or two - your tone and pace vary, you make some simple gestures, you move around a little (but not too much), introduce some humour if you can, smile or laugh at times, use different body language, etc. The more you are able to relax, the more natural your delivery, and the easier you will be on your audience. The best ways to reduce anxiety are to rehearse very thoroughly indeed (this cannot be stressed too strongly) and to gain experience by doing as many presentations as possible.

If you have prepared well, you will definitely avoid the two cardinal sins of public speaking - reading your slides/notes, and over-running you time. Keep eye contact with your audience, being as inclusive as possible. Looking at different individuals in different parts of the room from time to time is one way to ensure you don't forget this. You should also regularly look at the organizer or session chairperson during the second half of your presentation, to detect any signals such as time running out. It is selfish and self-defeating to exceed your time limit, as the audience is unlikely to concentrate on the content during the extra time anyway.

Handling Nervous Tension

The individual who is not nervous when they start a public talk is extremely rare; even the most well-known and highly respected academics will acknowledge anxiety and trepidation. To calm your nerves, try some of the following techniques:

- In the 5 or 10 minutes preceding your talk, switch off from what is happening around you and inwardly rehearse your opening sentences. This ensures you will get off to a good start, whereupon your confidence will grow as the talk progresses
- Before the talk, contract your stomach muscles while simultaneously breathing out hard; this relaxes you and will improve your voice quality
- When you take to the podium or lectern, pause for a minute to look at your audience so as to accustom yourself to them, find sympathetic or friendly faces, and mentally tell yourself that you will do fine

- If you feel yourself becoming tense during the talk - pause, take a deep breath and let it out slowly. Wait until it passes, perhaps taking a drink of water or clearing your throat if this is easier for you
- If the paper you are presenting has co-authors you trust, is sanctioned by your supervisor, or was accepted by reviewers, then the suitability of your paper is already established, so do not suffer needless anxiety over the worthiness of your research
- No-one forms a bad impression of another's research because of the poor quality of a presentation; remind yourself there will be no lasting ill-effects even in the unlikely event of the presentation being a failure

Answering Questions

While question time can be traumatic for the under-prepared, the diffident or the under-experienced, one should be appreciative of questions asked. It shows interest and knowledge on the part of the questioner, and gives a good opening to chat to them afterwards, possibly learning from this and making valuable new contacts.

There are three main types of questions asked of presenters:

1. requesting information
2. attention seeking
3. malicious questioning

Requests for Information

Most questions are simply directed at finding out more information, in order to better understand what you have presented. If you are well prepared and sufficiently familiar with the work, these pose no problem and should be welcomed. Answer honestly and concisely. If you do not understand the question, say so. Once you do, repeat the question in your own words so that everyone can hear and interpret the answer in the way you intend. If you are insecure about answering, and feel that a team member in the audience would be better able to do so, you should nonetheless give your best response and leave it up to your colleague to help you if they think it necessary. If you do not know the answer, say so directly, as you are unlikely to make up a good reply on the spur of the moment when you are already under pressure. Say so confidently, and be careful not to fob off your predicament by saying "it is not known" rather than "I do not know", unless you have established this fact in your literature search.

Attention Seekers

Some questions are posed simply to draw attention to the questioner, so as to show off their intelligence, knowledge, experience or imagination. Such a question is best dealt with by repeating it and then answering it in a way that compliments the questioner without being patronizing. While much of this waste everyone's time, it is also true that the main benefit of a presentation is usually the insight gained from exactly this type of question, so have an open mind and treat each question seriously.

Malicious Questioning

Malicious questions attempt to ridicule the presenter and cast doubt on their work or its significance. This is hard for anyone to deal with, but remember that it happens to everyone at some time - so you have the sympathy of others in the audience. Frequently the questioner is known for habitually attacking speakers in this way and hence the criticism is viewed in this light (it might even be more worrying if such a person does not bother to ask you such a question!) Sometimes such a questioner is not even well versed in the topic, but is simply wanting to find out how you cope with pressure (e.g. in an interview situation). The best approach is to answer as politely and briefly as possible, and avoid

long exchanges with this person, if necessary by suggesting that you discuss the issue further off-line. A one-to-one talk is likely to be much less hurtful and destructive, if indeed it takes place at all.