How to give a good research talk

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Abstract

Giving a good research talk is not easy. We try to identify some things which we have found helpful, in the hope that they may be useful to you.

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1 What this paper is about

By a "research talk" we mean a presentation of 30-60 minutes, given to a group of people who are motivated and intelligent, but who may not know much about your particular area.

The paper is heavily on our personal experience of giving talks in the area of Computing Science. What we have to say is quite different from what business people are often taught, but perhaps that's due mainly to a difference in the style of presentation needed for technical material.

Papers like this one often tend to consist mainly of "motherhood" statements, with which nobody could possibly disagree (such as "prepare well"), and thereby end up with little real punch. We have tried to avoid this, partly by deliberately overstating some things (the title, for example) in order to make our points more vividly.

We make no claim to have all the answers; rather, we have simply tried to write down suggestions which have worked for us in the hope that they may be useful to you. Everyone is different, so take what is useful for you, and ignore the rest.

2 What to say

You should usually see your talk *primarily as a "taster" for your work, rather than as an in-depth treatment.* So two very useful questions to ask are these:

- *Who is my primary audience?*
- *If someone remembers only one thing from my talk, what would I like it to be?.*

If you have the answer to these questions pinned down, you can use them as criteria when deciding what to say and what to omit. And don't forget to tell the audience the answer to the second question!

2.1 Using examples

Most of us do research by trying to solve a bunch of related problems, finding some suitable framework in which to solve them, and then generalising and abstracting our solution. For example, if the problem is to find out whether a function evaluates its argument, then a suitable framework might be denotational semantics, and a generalisation might be abstract interpretation.

The Awful Trap is to present only the framework and the abstraction, leaving out the motivating examples which you used to guide your work. Many talks are far too abstract. They present slide upon slide of impressive-looking squiggles, but leave the audience none the wiser.

It is utterly vital to present examples which demonstrate the points you are trying to make. When you give a definition of a property, or a mathematical structure, or some new notation, give examples to show what the definition captures. When you give a theorem, give examples to show what it means in practice.

Of course in a written paper you must be careful to fill in the details, and state precisely what is going on (though a good paper has plenty of motivating examples too). With any luck, your talk will persuade your listeners to read your paper, but a talk is the wrong medium in which to demonstrate your mathematical virtuosity.

The need to motivate and illustrate your talk with examples is probably the most important single point in this paper, because so many talks fail to do so. Ask yourself again and again: *"have I illustrated this idea/theorem/definition/technique/algorithm with an example?"*.

2.2 Pruning: saying enough without saying too much

The tension is this: you need to say enough to convey the essential content of your idea, but you must not overwhelm your audience with too much material.

The best way out of this dilemma is to adopt a non-uniform approach to your talk; that is, treat some aspects in more detail than others. It may be painful not to talk about the other parts, but it is better than only giving a superficial treatment to everything, or over-running your time.

Given that there are bound to be people in your audience who don't know the area at all, some overall introduction/motivation is usually essential. But do avoid the temptation of spending five or ten minutes on rambling introductory remarks. Sometimes, for example, people start with a slide listing prior work on the subject of the talk, or with an abstract description of what the talk is about.

Don't waste time on this — instead jump straight in with an example which demonstrates the problem you are addressing. Remember: if you bore your audience in the first few minutes you may never get them back.

2.3 Telling it how it is

Avoid the temptation to conceal problems you know about in your work. Not only is it dishonest: it is also ineffective. A bright audience will find you out.

Furthermore, if you are open about the difficulties, you may find that someone makes a suggestion which turns out to be just what you need. Get your audience to help you do your research!

3 Visual aids

Use an overhead projector. A research talk is just too short to be able to give a sensible development on the blackboard, and 35mm slides take far too much preparation. (There are exceptions, of course. For example, in graphics talks, 35mm slides are often necessary, and sometimes even video. In this case, minimise technology intrusion by minimising changes between overheads, slides and video.)

3.1 Technology

Write your overhead slides by hand, rather than use LaTeXor other machine-based typesetting technology, unless your handwriting is utterly abysmal, because:

- It frees you from having to prepare the entire talk before leaving for your trip. Handwritten slides in the middle of a typeset sequence look all wrong.
- It makes it easy to use colour.
- It makes it vastly easier to draw diagrams, add little arrows and bubbles, and so on. Of course this can be done by computer, but it is much, much slower.
- It is all too easy to be seduced by the apparent neatness of typesetting. Remember that time you spend fiddling with the typesetting is time you are *not* spending on the content.
- Typesetting adds to the temptation to put put a slide which has too much information, because it will still "fit". If you do typeset your slides, use a large font (at least 17pt). This makes your slides physically more legible, and usefully limits how much will fit.

Naturally, there are times when it is better to use the odd slide or two of typeset material — computer output for example.

Use permanent-ink overhead projector pens. This is very important. The water-soluble kind rapidly get tatty and smudged (if your hands don't sweat when you are speaking your physiology is different to ours), and their colours are much less vivid. You can get plastic erasers for such pens, so you can still correct mistakes.

Throw away the flimsy tissue-paper backing which come with OHP slides. Instead use ordinary paper from your recycling box. They get in much less of a mess, and you can write notes on the backing sheet to remind you of points you want to make which don't appear on the slide itself.

Consider writing your slides "sideways" (landscape-style). This allows you to write larger, increasing legibility, and usefully limits how many things you can write.

Overlays (combined with use of colour) can be very helpful when presenting complicated examples, because they reduce the amount of new material to read on each successive slide. However, much of the advantage is lost if you pick up the slides to align them properly: the audience can't keep their eye on the old stuff to see what's new.

3.2 What to put on a slide

When writing slides remember that people can read and take in only very little information. Six or seven "things" on one slide is quite enough.

Slides shouldn't repeat what you plan to say, but they should emphasise it; don't waste visual bandwidth on things you are also going to say. People who copy their paper onto slides and then read from them are immensely irritating. You should plan to talk ABOUT what's on your slides, not read it. (This may mean you need separate notes to remind you of what you want to say.)

It is conventional to start with a contents slide, giving the outline of your talk. Don't. It takes a precious minute to talk through it, and your audience won't understand it till later. Certainly never include such trivia as "introduction", "conclusion". These are understood as a necessary part of every talk.

On the other hand, about a third of the way through, it can be quite helpful to draw breath with a slide which says "This is what I have discussed so far, and now I'm going on to cover these areas", or some such. This can help to re-orient your audience, and make it clear that this is the moment to ask questions if they are lost already. Another way to add signposts is to begin each section of your talk with a slide containing only the title of the section.

3.3 Preparing slides

Don't start writing slides too early. It is Parkinsonian process: it simply expands to fill the time available. So don't make too much time available.

As indicated earlier, we often mull over what we are going to say for a week or two beforehand, but only actually write the slides the night before. This has the merit that the material is absolutely fresh in your mind when you give the talk, though you do need to have a clear idea in advance of what you are going to say.

Regard with extreme prejudice the temptation pull out old slides from previous talks, and glue them together into a new talk. It almost always shows. Somehow the old slides are never quite appropriate. (It's fine to simply repeat a complete previous talk, of course.)

4 Giving the talk

4.1 Nerves

If you don't feel nervous before giving a talk, especially to a large or unfamiliar audience, you are a most unusual person. Between us we have given hundreds of talks, but the feeling that your legs just won't support you when you stand up in front of all those people never goes away. Do try steady, deep breathing beforehand, and relaxation exercises, but don't expect to feel calm.

Remember: the person who just gave that confident, assured presentation before you almost certainly felt just the same.

If you can make eye contact with your audience, then do so. A talk is greatly improved if the audience recognise they are being *talked to* rather than being *talked at.*

4.2 Presenting your slides

Some people hide most of their slide under a piece of paper, revealing it line by line, as they go through it. Occasionally this is just the right thing to do, but people quite often do it all the time, which we find a very irritating habit. Perhaps it helps to focus your listener's attention on the part you are talking about, but it is also rather condescending ("you can't be trusted to listen to me if I show you the next line too"). If you find yourself wanting to use this technique, ask yourself whether the material would not be better split over two slides.

There are exceptions: when you have a punchline to reveal, for example, or when you need to emphasise that something proceeds stage by stage; but it is a technique to use very sparingly. The inexperienced speaker especially doesn't need the extra hassle of messing about with a bit of paper.

An overriding goal must be to make the slides themselves as invisible as possible. It is the content that is important. This leads to a couple of other don'ts: don't use slides with a rip-off backing sheet; don't use a ring binder to hold your slides during the talk, especially if you open and close it between each pair of slides; don't switch off the overhead projector between slides. Each of these emphasises the existence of the slides as entities in their own right.

The only reason you use an overhead projector is so that people can see your slides. So don't block their view. For this reason it is often better to point at the screen than at the slide. In a big lecture room a pointer can help with this, but try not to bang the screen with it – it makes everyone else's eyes go funny.

4.3 Timing

Don't over-run. It is selfish and rude. Either you will be cut off by the chairperson before you have reached your punchline, or you will compress others' talks, or you will make everyone late. In any case, you audience's attention span is limited, so you probably won't manage to convey much in your over-time period.

As you get more experienced, you will learn how long a single slide lasts in your talks. The average for most people is probably 2 to 3 minutes. Plan a couple of places where you can leave out a bunch of slides, and check your watch when you get to them.

It's a good idea to have a couple of slides at the end of your talk which you can use in the unlikely event that you finish early, but which you usually expect not to use.

5 Conclusion

So there you have it. As we said in the introduction, our suggestions are simply ideas that we have found work for us; we hope they may work for you also.

Without a doubt it is worth putting thought and effort into presentation skills. Your work, no matter how brilliant, becomes valuable to others only in so far as you communicate it to them.