

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 \LaTeX or 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 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, your 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.

Oral Presentation Advice

[Mark D. Hill](#)

Computer Sciences Department
University of Wisconsin-Madison

April 1992; Revised January 1997

- [Things to Think About](#)
 - [A Generic Conference Talk Outline](#)
 - [Academic Interview Talks](#)
 - [Other Talks](#)
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Things to Think About

1. Oral Communication is different from written communication

Listeners have one chance to hear your talk and can't "re-read" when they get confused. In many situations, they have or will hear several talks on the same day. Being clear is particularly important if the audience can't ask questions during the talk. There are two well-known ways to communicate your points effectively. The first is to K.I.S.S. (keep it simple stupid). Focus on getting one to three key points across. Think about how much you remember from a talk last week. Second, repeat key insights: tell them what you're going to tell them (Forecast), tell them, and tell them what you told them (Summary).

2. Think about your audience

Most audiences should be addressed in layers: some are experts in your sub-area, some are experts in the general area, and others know little or nothing. Who is most important to you? Can you still leave others with something? For example, pitch the body to experts, but make the forecast and summary accessible to all.

3. Think about your rhetorical goals

For conference talks, for example, I recommend two rhetorical goals: leave your audience with a clear picture of the gist of your contribution, and make them want to read your paper. Your presentation should not replace your paper, but rather whet the audience appetite for it. Thus, it is commonly useful to allude to information in the paper that can't be covered adequately in the presentation. Below I consider goals for [academic interview talks](#) and [class presentations](#).

4. Practice in public

It is hard distilling work down to 20 or 30 minutes.

5. Prepare

See David Patterson's [How to Give a Bad Talk](#)

A Generic Conference Talk Outline

This conference talk outline is a starting point, not a rigid template. Most good speakers average two minutes per slide (not counting title and outline slides), and thus use about a dozen slides for a twenty minute presentation.

- **Title/author/affiliation** (1 slide)
- **Forecast** (1 slide)
Give gist of problem attacked and insight found (What is the one idea you want people to leave with? This is the "abstract" of an oral presentation.)
- **Outline** (1 slide)
Give talk structure. Some speakers prefer to put this at the bottom of their title slide. (Audiences like predictability.)
- **Background**
 - **Motivation and Problem Statement** (1-2 slides)
(Why should anyone care? Most researchers overestimate how much the audience knows about the problem they are attacking.)
 - **Related Work** (0-1 slides)
Cover superficially or omit; refer people to your paper.
 - **Methods** (1 slide)
Cover quickly in short talks; refer people to your paper.
- **Results** (4-6 slides)
Present key results and key insights. This is main body of the talk. Its internal structure varies greatly as a function of the researcher's contribution. (Do not superficially cover all results; cover key result well. Do not just present numbers; interpret them to give insights. Do not put up large tables of numbers.)
- **Summary** (1 slide)
- **Future Work** (0-1 slides)
Optionally give problems this research opens up.
- **Backup Slides** (0-3 slides)
Optionally have a few slides ready (not counted in your talk total) to answer expected questions. (Likely question areas: ideas glossed over, shortcomings of methods or results, and future work.)

Academic Interview Talks

The rhetorical goal for any interview talk is very different than a conference talk. The goal of a conference talk is to get people interested in your paper and your work. The goal of an interview talk is to get a job, for which interest in your work is one part.

There are two key audiences for an academic interview talk, and you have to reach both. One is the people in your sub-area, who you must impress with the depth of your contribution. The other is the rest of the department, who you must get to understand your problem, why it is important, and a hand-wave at what you did. Both audiences will evaluate how well you speak as an approximation of how well you can teach.

An algorithm:

- Take a 20-minute conference talk.
- Expand the 5 minute introduction to 20 minutes to drive home the problem, why it's important, and the gist of what you've done.
- Do the rest of the conference talk, minus the summary and future work.
- Add 10 minutes of deeper stuff from your thesis (to show your depth). It is okay lose people outside of your sub-area (as long as you get them back in the next bullet).
- Do the summary and future work from the conference talk in a manner accessible to all.
- Add 10 ten minutes to survey all the other stuff you have done (to show your breadth).

- Save 5 minutes for questions (to show that you are organized).

Other Talks

Other talks should be prepared using the same principles of considering audience and rhetorical purpose. A presentation on a project in a graduate class, for example, seeks to reach the professor first and fellow students second. Its purpose is to get a good grade by impressing people that a quality project was done. Thus, methods should be described in much more detail than for a conference talk.

Acknowledgments

Thanks to Jim Goodman, Jim Larus, and David Patterson for their useful comments. The current on-line version of this document appears at URL

"<http://www.cs.wisc.edu/~markhill/conference-talk.html>".

How to Give a Bad Talk

David A. Patterson

Computer Science Division
University of California-Berkeley

Circa 1983

Ten commandments (with annotations gleaned from Patterson's talk by Mark D. Hill):

I. Thou shalt not be neat

Why waste research time preparing slides? Ignore spelling, grammar and legibility. Who cares what 50 people think?

II. Thou shalt not waste space

Transparencies are expensive. If you can save five slides in each of four talks per year, you save \$7.00/year!

III. Thou shalt not covet brevity

Do you want to continue the stereotype that engineers can't write? Always use complete sentences, never just key words. If possible, use whole paragraphs and read every word.

IV. Thou shalt cover thy naked slides

You need the suspense! Overlays are too flashy.

V. Thou shalt not write large

Be humble -- use a small font. Important people sit in front. Who cares about the riff-raff?

VI. Thou shalt not use color

Flagrant use of color indicates uncareful research. It's also unfair to emphasize some words over others.

VII. Thou shalt not illustrate

Confucius says ``A picture = 10K words," but Dijkstra says ``Pictures are for weak minds." Who are you going to believe? Wisdom from the ages or the person who first counted goto's?

VIII. Thou shalt not make eye contact

You should avert eyes to show respect. Blocking screen can also add mystery.

IX. Thou shalt not skip slides in a long talk

You prepared the slides; people came for your whole talk; so just talk faster. Skip your summary and conclusions if necessary.

X. Thou shalt not practice

Why waste research time practicing a talk? It could take several hours out of your two years of research. How can you appear spontaneous if you practice? If you do practice, argue with any suggestions you get and make sure your talk is longer than the time you have to present it.

Commandment X is most important. *Even if you break the other nine, this one can save you.*

ENGINEERING WRITING CENTRE

Other Resources
for ECE 496
Students

[Writing Centre Page
on Progress
Reports](#)

[Writing Centre Page
on Interim Reports](#)

[Prof. Frank
Kschischang's Guide
to Giving a Talk](#)

[ECE 496 Course
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[Information about
Oral Communication
Workshops](#)

ORAL PRESENTATION

INTRODUCTION

This Page provides an overview of how to make a technical presentation, as presented in ECE 496 lecture on November 16th, 1999. This page covers three main aspects of making a Technical presentation:

- [Preparing your Talk](#)
- [Presenting your Talk](#)
- [Supporting your talk with Visuals](#)

For more detail, have a look at Prof. Frank Kschischang's page on "Giving a Talk." Also, consider taking the Writing Centre's four-week workshop on Oral Communication. It will begin in the second week in January.

PREPARING YOUR TALK

Preparation is the most important part of a talk. If you haven't done it, you do not have a chance of making a good oral presentation. Here are a number of crucial points to consider:

[Audience](#)

[Time and
Focus](#)

[Organization](#)

[Practice](#)

1. Audience

Connecting with our audience is the major task of your first minute or so of your talk. To do this, you need to do one of the following:

- Present your topic as an interesting problem or question that needs to be resolved
- Ask your audience a thought provoking question that your presentation will answer
- Offer a brief story or anecdote that leads into your topic.

Before you present, consider carefully who will be your audience, and ask:

- What do they know?
- What will interest them?

2. Time and Focus

Know how long do you have and fit into that time. It is easy to run overtime. The only way to stay in time is to be ruthlessly selective: What is essential to include?

Think of the talk as a kind of verbal abstract: you want to give a clear picture of the project, but you won't be able to go into much technical detail. What is the central point you want to make? Make it early, clearly and often.

3. Organization

Many students are unfamiliar with how to organize a talk. Talks

differ from papers or reports because they need to be more repetitive. The old advice goes like this:

"Tell 'em what you're going to tell 'em, then tell 'em, and then tell 'em what you told 'em."

what you're going to tell 'em

What this means is, first, you need to provide a clear introduction, which prepares us for a central section, and is concluded by some kind of summary. This relates to the point about audience above. The introduction needs to accomplish three things:

1. Prompt interest
2. Provide an **overview** of the whole talk
3. Make the **purpose** of the talk (and project) clear.

Here is an example of an opening moment of a talk that accomplishes all three tasks reasonably well. Note that this opening clearly let's the listener know what they should know by the end.

"If you have ever had an ultrasound, perhaps because you were pregnant or had appendicitis, you will have noticed that reading an ultrasound image is a lot like watching a black and white TV without cable: the image is grey and buried in falling snow. No wonder it requires an expert to read them. Our design project is to develop a prototype for part of an ultrasound imaging device that plays a significant role in the quality of the image. The part is called a transducer. I will explain the role of this small but important part, and then explain how our project will contribute to improving current ultrasound technology."

telling 'em

Making the body of the talk clear involves more than just having a lot to say on a topic. Here are two key strategies:

- I. **Follow the order set out by the Intro**
The midsection of the sample talk above needs to develop the points made in the opening, *in order*: 1. role of the part, and then 2. contribution to ultrasound. That way, the audience can follow easily.
- II. **Provide clear "road signs"**
Road signs are phrases that signal the transitions from one point to another in the talk. Don't underestimate their importance. Here are a few samples:

My second point ...	Now that you understand how
finally ...	the transducer works, ...
In conclusion...	An interesting side note is ...

These cues help the listener understand where you are in the talk and how much longer they have to pay attention. If the listener's mind has wandered, these cues also provide ways to refocus. Such devices ensure that your audience

The first sentence prompts interest.

The third establishes the purpose.

The last sentence provides an overview of the talk.

clearly understands what you expect them to know and think by the end of your talk.

telling 'em what you told 'em

The conclusion should provide a concise "take away" message. My final slide from the talk this page is based on is in a [box](#) at the bottom of the page. It is a concise message that, I hope, is memorable.

4. Practice

Don't memorize. Under the pressure of presentation you're liable to forget and then you're stuck. Instead, *know* it. If you understand your material and your organization, you are much less likely to get stuck or tongue-tied. The best way to *know* is practice, practice, practice. Give yourself an audience if you can -- friends, a Writing Centre tutor-- and ask them to critique your delivery.

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DELIVERING YOUR PRESENTATION

Delivering your talk is obviously the moment that counts. Here are three key aspects to consider:

Space	Physical Presence	Vocal Presence
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1. Space

Know the room from the front. The front of the class feels different from the seats you are normally used to. Know the resources. Do you have an overhead? a microphone? a datacam?

2. Physical Presence

The audience wants to know you are confident. It will enable them to trust your information. How will you convey that confidence?

You can begin by following the usual commonplaces:

- don't fidget
- look at your audience (not at your overhead slide)
- don't hold papers that rustle or pens that click, or the change in your pocket that clinks.
- don't read your talk.

More important, however, is that you become comfortable with your own gestural style. Nervousness and discomfort show. If you look like you want to crawl out of your own skin, it will detract from your point. Getting comfortable involves taking to heart a couple of key points:

- a. **It's not about you.** You are not the focus, your topic is. Make sure it remains the focus, by helping people concentrate on the subject not on you.
- b. **Decide how much you like to move.** Neither moving nor standing still is wrong. Use either to make yourself comfortable.
- c. **Find somewhere to put your hands.** Nervous hands tend to go places you'd rather they didn't-- up your nose, into your ear, through your hair Think of your hands as God-given laser pointers. Use them to stress key ideas or depict a key

shape. Practice these before the talk so you know where your hands are going to go.

- d. **Find focus points.** Pinpoint safe places, or safe faces. These will probably not be your friends (they're liable to make you laugh), or the gorgeous hunk or babe you've been trying to impress for three years (he/she is liable to make you forget everything just as they did the last time you asked them out). Look for neutral faces positioned around the room. That way as you're making eye contact, you'll know you can look without being thrown off your talk.

3. Vocal Presence

Obviously, a wide variety of vocal style is possible. As with physical style, the important thing is your comfort. Being comfortable means you can sound natural, and calm (even if you're not). Unfortunately, sounding natural is hard in a large room where you have to shout to be heard. There are tricks, of course, but these require training and practice like we offer in the oral communication workshops. Here, let me just offer a few pointers:

- Speakers with accents need to **slow down** (so do most others).
Non-native speakers often speak English faster than we slow-mouthed native speakers -- usually because your native language moves quicker than English. Slowing down helps the audience to comprehend your talk.
- Choose vocal emphasis to **avoid monotone**.
Loud/soft, high/low, fast/slow are used in English to gain emphasis and variety. For example, words such as "finally" or "now" are often delivered loudly or slowly to help the listener register a change.
- Practice to **avoid um, ah, like**.
These words occur most at transitions from one idea to another, so the better you know your talk, the better you can control verbal tics.
- Practice important words to **avoid embarrassment**.
Many Chinese students have difficulties distinguishing "l" and "r" and making dual vowel sounds so the phrase "virtual reality" is a killer with its strings of "r" "l" and "u-a" and "ee-a." So, if this is your thesis topic, *practice*. Get expert help from the writing centre and train your mouth to move appropriately.

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MAKING EFFECTIVE VISUALS

Visuals might overpower a talk and draw attention to themselves. This will make your talk fail. Good visuals *complement* a talk. They provide key text points that you will elaborate (never whole chunks that you read), or they contain a simplified graphic to give a visual image for a key concept.

Effective Visuals have the following:

1. A Clear Concise Message

This means you have to limit what goes on the slide. Five lines of text max. No complicated flow charts.

2. Horizontal Format and Consistent Border

Actually, most overheads and screens are virtually square, so don't try to cram to the edges of a horizontal slide.

3. Good Brightness and Contrast

Black on white always works well. Limited colour, say perhaps three, can also be effective.

4. Letters at Least 20 pt. font

This goes for diagrams as well as text.

5. Clear, Simple Font

Ariel or Helvetica are better than Times because they have letters all of equal width.

6. 1-2 Minutes per slide

Most engineering students try to deal overheads like they're dealing cards at a casino. Don't. Your audience needs time to absorb a slide.

IN SUMMARY

If you forget everything else, remember:

- Space
- Pace
- Saving Face



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