Rm Palaniappan, *Alien Planet-X-9*
Viscosity, pencil colour and ink on handmade paper

Communicating your research to others

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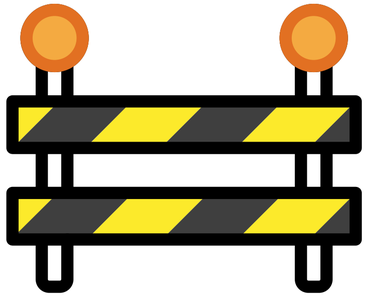
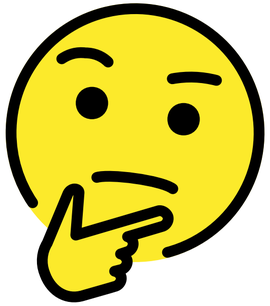
Images: Adobe Stock, personal collection, OpenMoji

Some pre-apologies

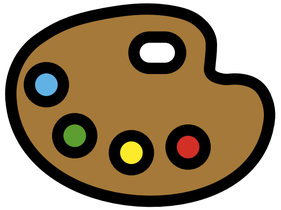
There is no “mastering” going on here



These slides themselves are not necessarily a good example of how to give a good presentation.



Hopefully it will give you some different perspective on how to create an approach to building presentations that reflects your own personal style.



While you can have art in a research presentation, a good talk is less about “art” and more about clarity.

Making good presentations is a skill

Don’t just listen to me

There is so much advice out there on how to give good talks: their advice is probably clearer/better than mine:

- David Patterson (UC Berkeley): *How to give a bad talk*
  https://people.eecs.berkeley.edu/~pattrsn/talks/BadTalk.pdf
- Simon Peyton Jones (MSR)
  https://simon.peytonjones.org/great-research-talk/
- MIT Communications Lab Comm Kit
  https://mitcommlab.mit.edu/eecs/use-the-commkit/

Important disclaimer:

This is not a good talk.

Think about the talks you've seen

What was engaging vs. confusing

All of us have been to bad talks.

All of us (I hope) have been to good talks.

Think back on some of those…

- Why was the talk effective?
- What did you learn from the talk?
- What did you want to do after the talk?

Why is giving a research talk hard?

There are many factors at work

Students are used to hearing talks or teaching prior knowledge:

A research talk is presenting new knowledge.

Students have a lot of other things that they are working on.

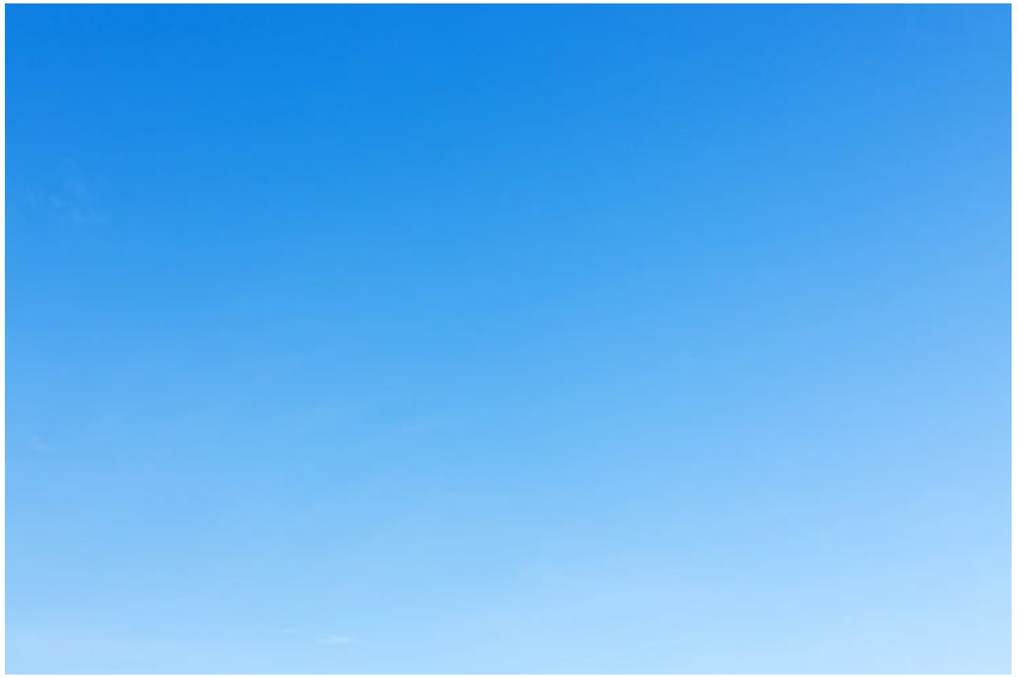
A research talk takes time and care to prepare.

Public speaking can be very stressful.

A research talk is a performance.

The most important point is clarity

In many different ways…



- Audience
- Intent/Objective
- Organization
- …

MIT Communications Lab Comm Kit
https://mitcommlab.mit.edu/eecs/use-the-commkit/

Goal for today

identify the who/what/why/how of research talks

based on my own experience

to help you think differently about designing and delivering talks

Who’s receiving the talk?

Identify the audience

Who/Where/When

It’s important to figure out who you are giving the talk to…

- Conference/workshop attendees
- Qualifying exam committee
- Group meeting
- Seminar at another school
- Job talk
- Thesis defense…

We tend to focus on “what” before “who”

You want to explain what you did & the results

Instead, think about what the background of the people listening is.

- What is the mix of people?
- Who are you (primarily) trying to reach?
- What do they know or not know already?
- Why are they at your talk?
- What questions do they think are important?

If you only target the biggest experts, other people will get lost!

Example: conference talk (theory)

Presenting original research to other specialists

Audience: grad students, postdocs, professors, industry researchers, mostly on the theoretical side.

Target: grad students should be able to understand what my contributions are if they work on somewhat related topics.

Background knowledge: basic grad courses and some related research papers but probably not the specific papers I am comparing against.

Motivation: either they want to know more about this problem in general or they work on related topics and can maybe use my approach or ideas for their work.

Questions: what could I show theoretically?

Example: conference talk (applied)

Presenting original research to other specialists

Audience: grad students, postdocs, professors, industry researchers in applied ML/AI.

Target: grad students should be able to understand but industry researchers should see how my system could be used in future products.

Background knowledge: probably not working on the same problem but will understand the application domain pretty well.

Motivation: to learn what insights/tricks I used in my design.

Questions: how good is my system compared to prior art?

Example: qualifying exam

Convincing the committee to pass you

Audience: professors who are not my advisor and do not work in my area.

Target: all committee members.

Background knowledge: will know the relevant courses that are required to take the qualifying exam.

Motivation: because they were assigned by the Graduate Director.

Orientation: want to assess whether I can effectively demonstrate knowledge and skills that are needed to conduct meaningful research.

Why are you giving the talk?

What before why…

… leads to wasted effort

If a speaker approaches a talk as just something they *have* to do then you will be able to tell.

- “I have to explain what I did”
- “I have to present to get the paper in the conference proceedings”
- “I have to the Qual to progress in grad school”

What do you want?

Objectives matter

If you go into designing the presentation with a stated objective, it will be easier to revise and refine.

- “I want to get feedback on my thesis proposal, like some other related work I may have missed.”
- “I want audience members to want to read my actual paper.”
- “I want to explore collaborations with this company.”

How should I design the talk?

Finally, the actual talk

First you need a target audience and a clear objective

Here is a *process* for approaching talk design:

- Write N (# of minutes of the talk) sentences/facts about your work
  Example: “Prior work focused on complexity and not energy efficiency.”
- Arrange them in order so that each follows logically from the previous sentence.
- Rewrite the sentences, throw some out, add others.

Important: each sentence should make sense knowing the previous sentences.

> “Every lecture should state one main point and repeat it over and over, like a theme with variations. An audience is like a herd of cows, moving slowly in the direction they are being driven towards. If we make one point, we have a good chance that the audience will take the right direction; if we make several points, then the cows will scatter all over the field. The audience will lose interest and everyone will go back to the thoughts they interrupted in order to come to our lecture.”
> — Gian-Carlo Rota
> *“Ten Lessons I Wish I Had Been Taught”*

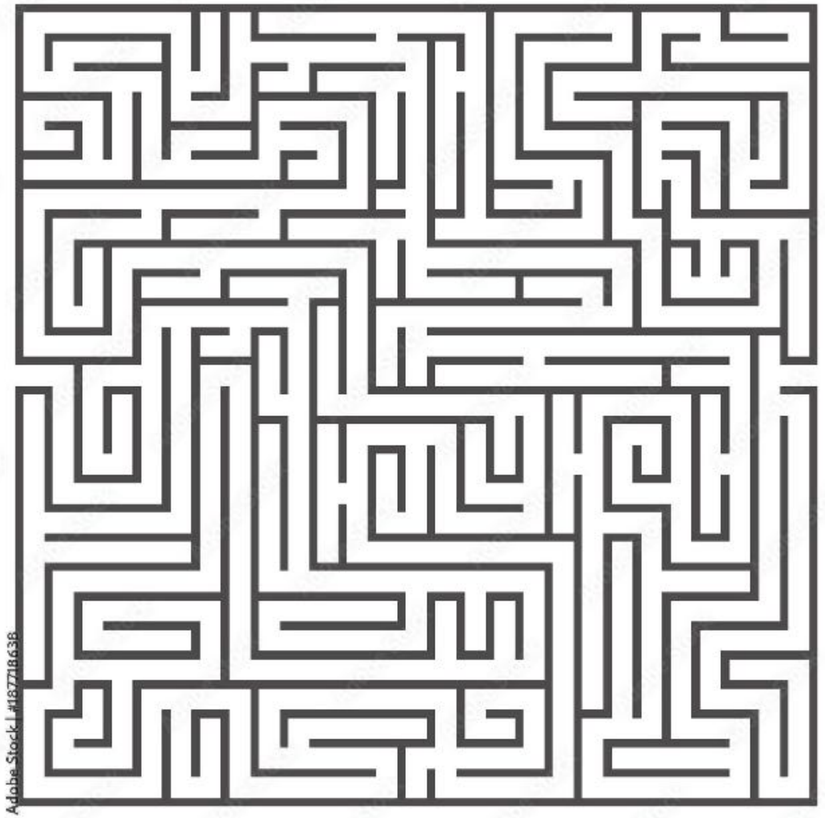
Example of a synopsis/outline

This is very short: to be a good talk will need some connectors

- One current paradigm in AI is to use large pre-trained models to generate “general features.”
- People assume that these “feature embeddings” are “universal” but different models produce different features.
- For generative AI, if two models are using “universal” features, does that mean that they are producing equivalent outputs?
- More generally, how can we compare two generative AI models?
- Our main idea: use features from a third model as a “microscope” to analyze generative AI outputs.
- One example experiment: we gave two LLMs the same prompts and analyzed embeddings of their outputs using a third LLM.
- Basic statistical tools like PCA and LDA show that the outputs of these LLMs are very different even though the text looks look similar.
- We can use this “feature embedding” = “microscope” on images too.
- We can also use it to tell the difference between data sources/datasets.
- There are a lot of implications for security, privacy, and detection of deepfakes…

Common errors in talk structure

Remember you are not talking to yourself



- Spending not enough or too much time on “the big picture.”
- Assuming the audience has read all the papers/ background that you have.
- Not stating the actual research question you want to answer.
- Jumping into experiment results without describing the actual experiment.

Try to give a practice talk to people outside your own research group!

One sentence = one idea = one slide

Making sure you don’t skip over things

Presentations are not papers and not abstracts.

- Part of your presentation is teaching the audience about the problem.
- Things that are obvious to you (e.g.. why the problem is interesting) still need to be explained.
- If you are time-limited: reduce detail (not cram in more slides).
- You can only make one point at a time.

Design is easier if you know the main idea for each slide.

Designing slides

There is infinite advice out there

There are lot of tools that can help you with slide design/layout but…

- You are the one who knows your audience and your objective.
- “Obviously outsourced” slides might make you look lazy: you should customize.
- Remember that content comes after form.

The biggest problem is not boring slides, it’s unclear structure/logic.

But visuals are important too…

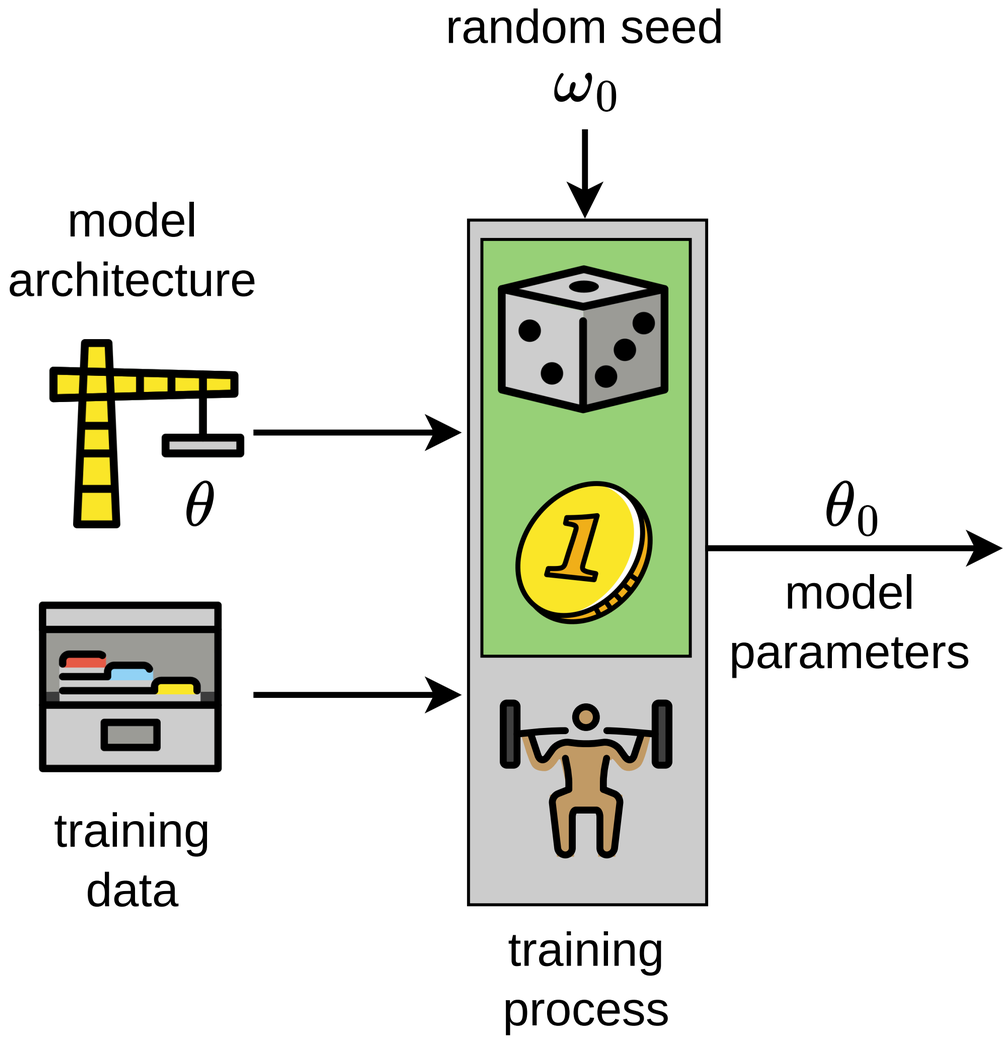
Some things to watch out for

Do not:

- Screenshot or copy-paste from the paper: equations, images, theorem statements, etc.
- Use long sentences.

Do:

- Re-render figures for visibility: thicker lines, bigger font, clearer colors.
- Add more figures and diagrams that are not in the paper!



Tools, tips, and tricks

Figures for slides are different than figures for papers

- Use vector graphic formats to avoid pixelation.
- Use colorblind safe colors for figures: for python, check out the `cmcrameri` package or others.
- If your figure has notation, make sure it's consistent and that you have defined it first.
- If you are using a figure that you did not generate, make sure to provide a credit/citation!
- draw.io has LaTeX support, RU has a site license for Adobe stock photos/QR generator.

How do I give the talk?

Public speaking is hard

It’s normal to be nervous

Giving a presentation can be very stressful!

Maybe…

- You’re more of an introvert.
- You’ve never talked about the work before.
- English may be your 2nd, 3rd, or 4th language.
- You think the stakes are high.

Practice makes ~~perfect~~ good enough

A different mindset helps too

Everyone is nervous about giving talks.

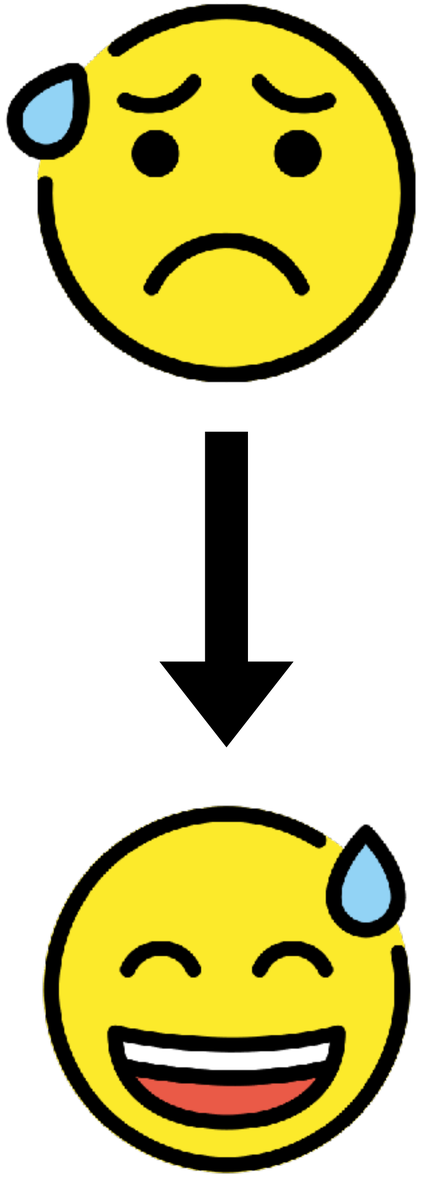
- You are sharing **something you are excited**/interested in to the audience.
- **Practice** the talk, get feedback, and edit/revise.
- **Use supports** if you need: notes, etc.

The stakes are probably lower than you think they are.

You can help yourself

Make a plan before the talk

- **Do not go over time:** Practice the talk so you have a sense of how long it takes.
- **Know what you can skip:** If you are running out of time, be able to jump to your conclusions.
- **Have backup slides:** If you can anticipate some natural questions, prepare a few extra slides.
- **Remember questions are good:** if people have questions they were paying attention.



What about posters???

Poster sessions can be good or terrible

Also posters can be good or terrible…

https://colinpurrington.com/2012/02/example-of-bad-scientific-poster/

We have all seen posters where the paper is copy-pasted into boxes.

Don't be that person.

- The RU template is optional.
- Poster structure ≠ paper structure.
- Less is more.

A poster is a visual aide for you, not a large-format version of your paper.

Recap and looking forward

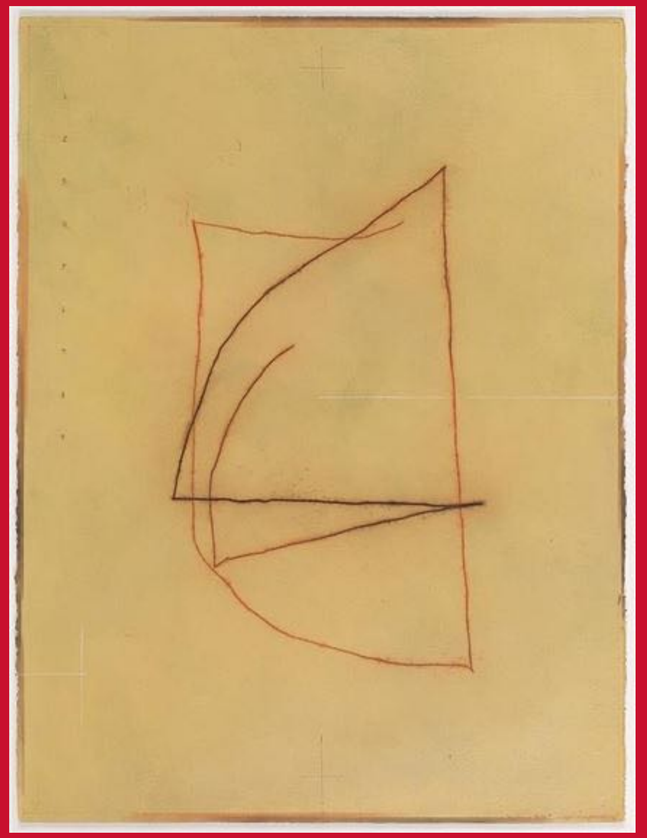
Presenting research is a skill you can learn

Clear thinking and planning makes clear communication

This was supposed to be a talk about mastering communication.

- Everything requires practice.
- Give yourself the time and tools you need.
- Use your peers: you’re not alone!
- Learn from your own experience.

Over time you will get better!



Thank you!

Rm Palaniappan, *Intense Talk*
Mixed media on paper pasted on mount board

Additional resources

Talks about talks

- David Patterson (UC Berkeley), *How to give a bad talk* https://people.eecs.berkeley.edu/~pattrsn/talks/BadTalk.pdf
- Simon Peyton Jones (MSR), https://simon.peytonjones.org/great-research-talk/
- MIT Communications Lab Comm Kit: https://mitcommlab.mit.edu/eecs/use-the-commkit/
- Tao Ju, *How to give a great research talk*, https://research.engineering.wustl.edu/~pcrowley/cse/591/researchtalk_tao.pdf
- David Fleet, Aaron Hertzman, *How to give a good talk,* https://www.dgp.toronto.edu/~hertzman/courses/gradSkills/2010/GivingGoodTalks.pdf
- Andreas Zeller, How to give a good research talk, https://www.st.cs.uni-saarland.de/edu/specmine11/slides-good-talk-howto.pdf
- David Patterson (UC Berkeley), *How to give a bad talk* https://people.eecs.berkeley.edu/~pattrsn/talks/BadTalk.pdf