



Scientific Presentations

Strategies for engaging and Effective Communication

Beatriz Sousa



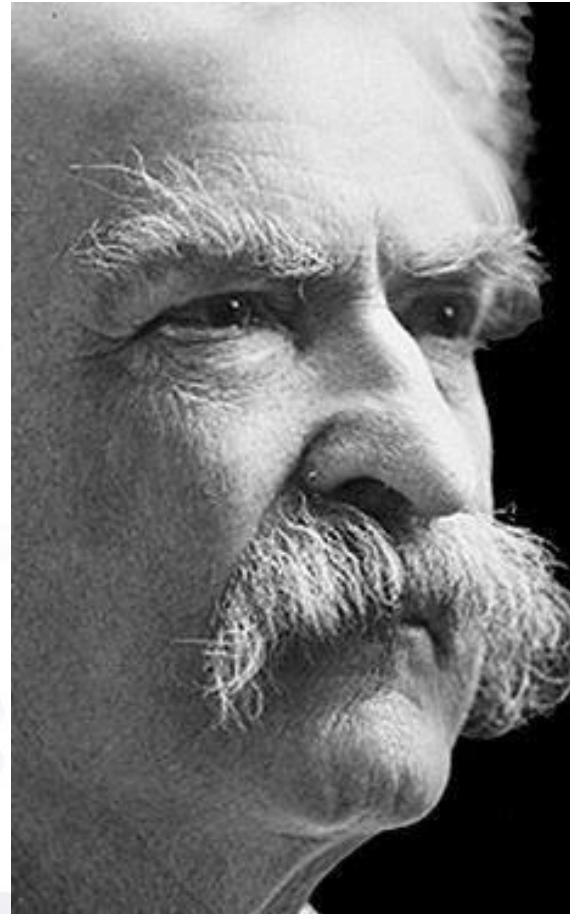
This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement No 952377

Goals for today

- < Overcome nervousness and become more confident
- < Plan presentation with audience and message in mind
- < Learn how to structure your presentation
- < Find the right level of detail
- < Reference your sources
- < Learn how to prepare and train for a presentation
- < Engage audience and maintain their attention
- < Handle difficult questions effectively

Overcoming Nervousness

- > Acknowledge and understand your fear: **it's completely normal!**
- > Preparation is key: the better you prepare, the more confident you'll feel
- > Practice: in front of your colleagues, friends... Or record yourself
- > Don't Forget to breathe: deep breaths before and during
- > Remember why you're there: you want your audience to learn something, not to become the next viral TED Speaker



There are two
types of speakers,
those that are
nervous and
those that
are liars.

- Mark Twain

Group therapy moment

- > Think of the worst thing that could happen during your presentation and write it down.
- > Can we think of strategies to handle these situations?



Planning your presentation

1. Know your audience: background, expectations, level of expertise
2. Define your goal: Informing? Persuading? Training?
3. Think of your message: 3-5 key points
4. Structure your content: clear beginning, middle, and end



Know your crowd

- > Divide into pairs
 - > Group 1 – High School Students
 - > Group 2 – Experts in your field

- > How would you adjust your presentation according to your audience? (tone, detail, examples)



Structuring your Presentation

- < Deconstruct your content
- < Construct a logical flow of concepts
- < Insert visualization, interaction and activities



Structuring your Presentation



Introduction

- < Grab attention
- < Why it matters
- < Roadmap



Main Body

- < Present key points with supporting evidence
- < Use clear transitions

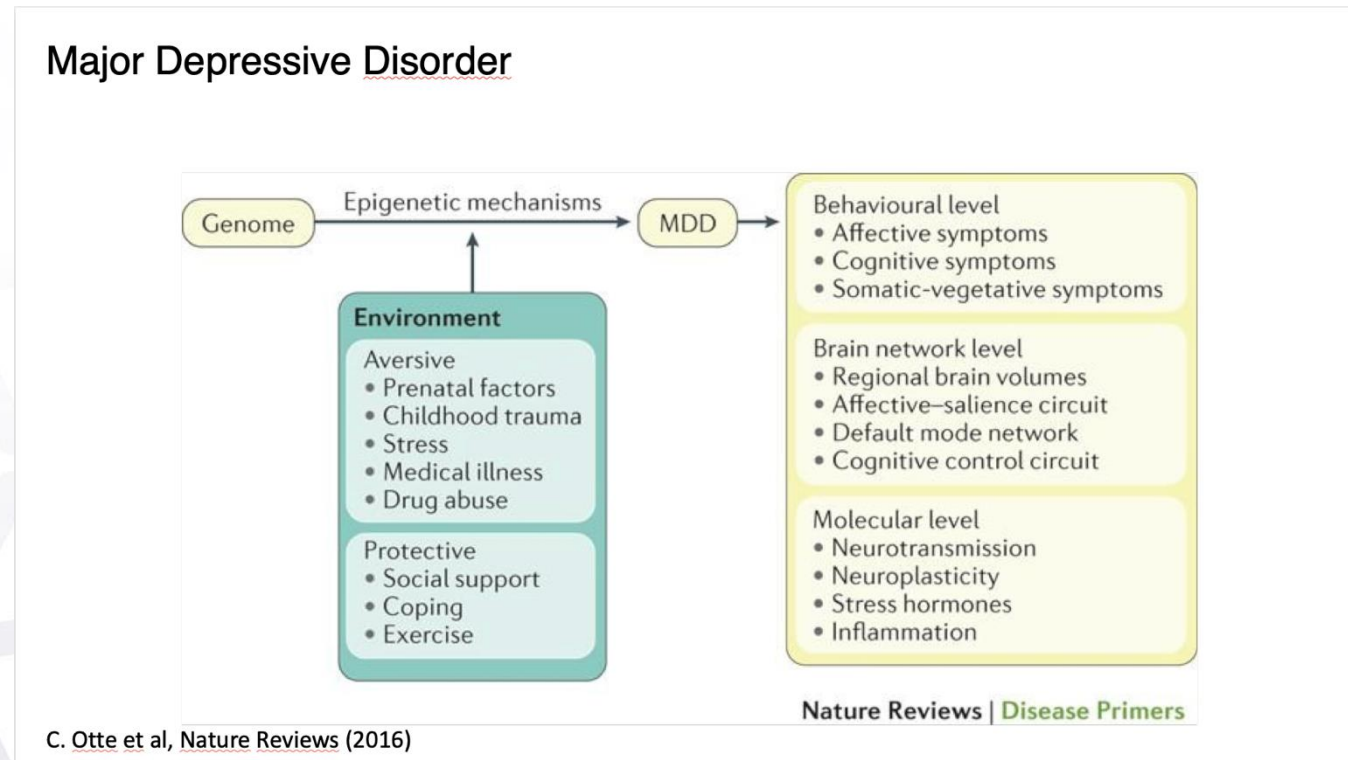


Conclusion

- < Summarise main takeaways

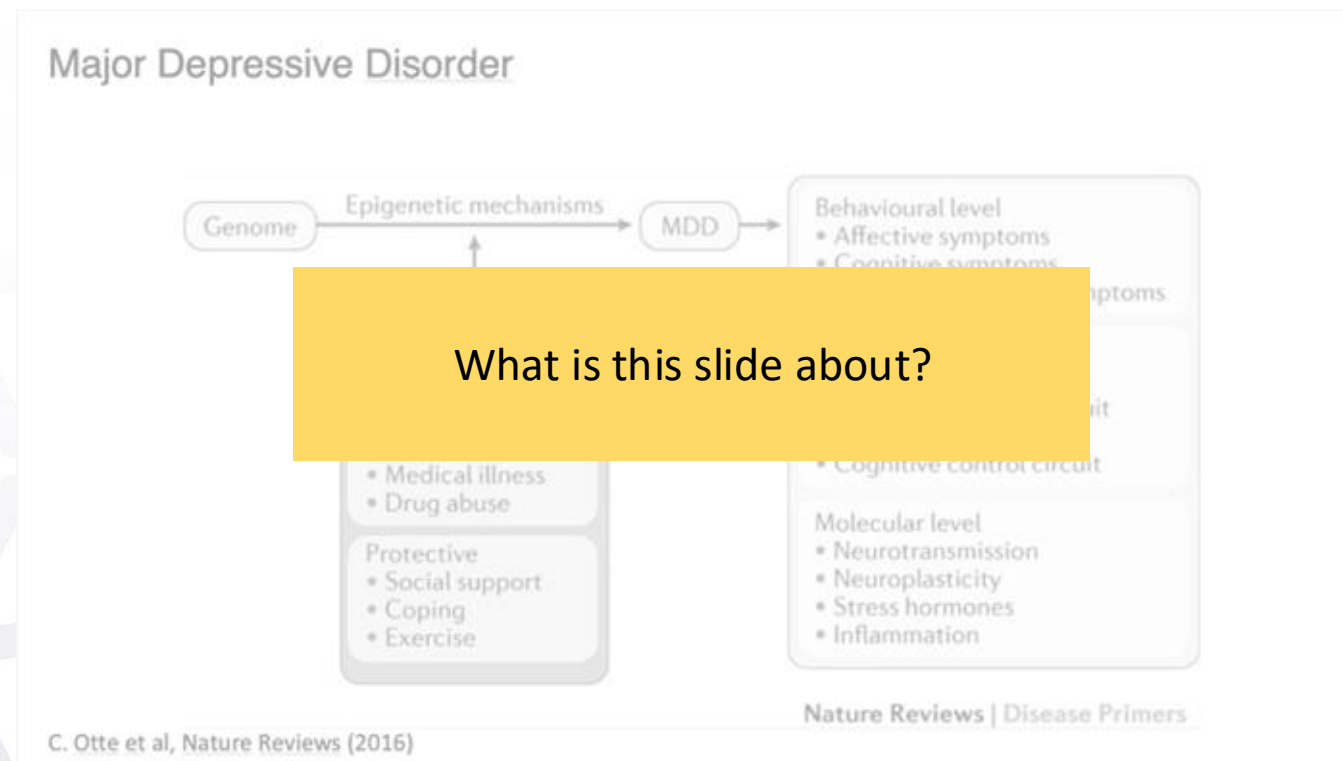
How to design your presentation

- > Keep your slides simple and visually appealing: each slide as a single message unit
 - > Explicitly state that single message on the slide



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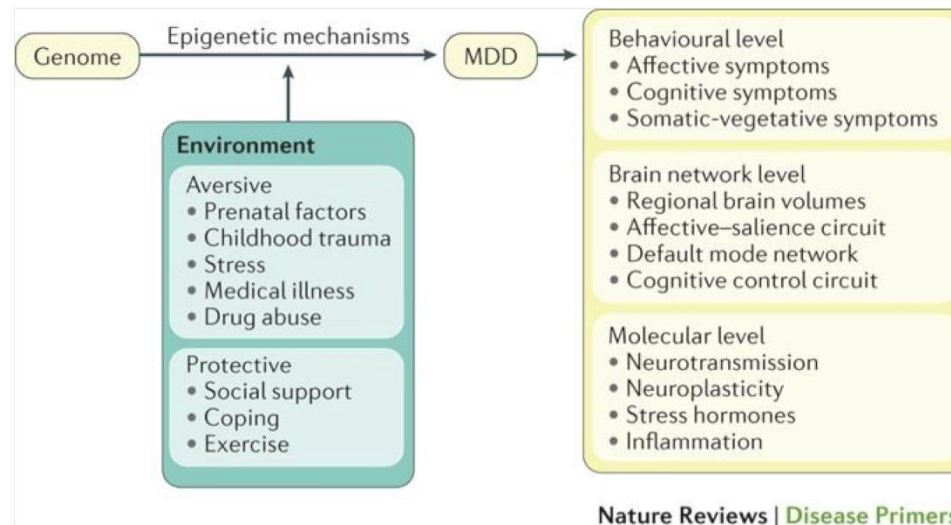


What is this slide about?

How to design your presentation

- > Keep your slides simple and visually appealing: each slide as a single message unit
 - > Explicitly state that single message on the slide

Major Depressive Disorder Has a Multifactorial Etiology



C. Otte et al, Nature Reviews (2016)

Now we understand that the slide is about the etiology of MDD and its multifactorial causes

Audience knows what to take away

How to design your presentation

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▶ What is Apoptosis & how does it happen?

Definition

Death of individual cells by fragmentation into membrane-bound particles, which are phagocytized.

Note: apoptosis elicits no inflammatory response in adjacent cells, tissues.

How it happens

- Typically genetically programmed
 - Induced by injury to cellular DNA – e.g., by irradiation and cytotoxic agents
- Note:* Can be suppressed by naturally occurring factors (e.g., Prot. Kinase AKT) and by some drugs (e.g., prostaglandin E2).

If you have 2 different topics, label each one clearly

How to design your presentation

↳ Avoid too much text: When your audience reads, they don't hear you

Tooth decay in adults, 2011 - 2016

This graph shows us that, some older adults were more than **twice as likely** to have untreated tooth decay.

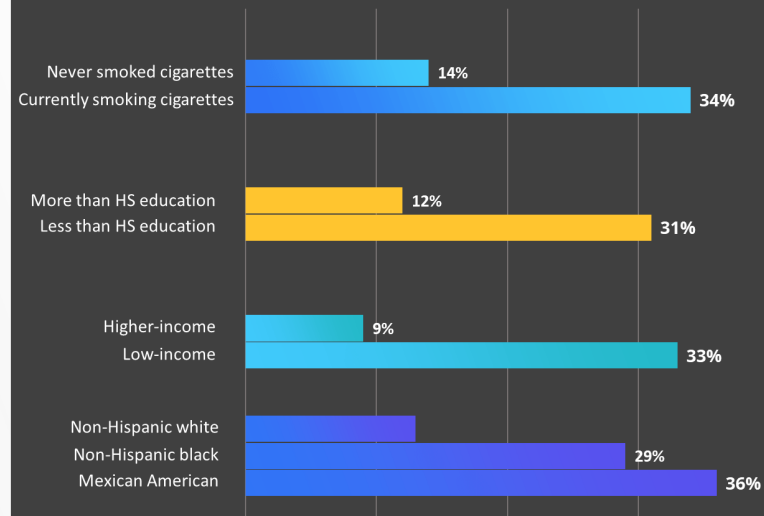
About 1 in 3 adults aged 65 or older who were:

- Mexican American
- non-Hispanic black
- low-income
- had less than a high school education
- currently smoking cigarettes

Had untreated tooth decay.

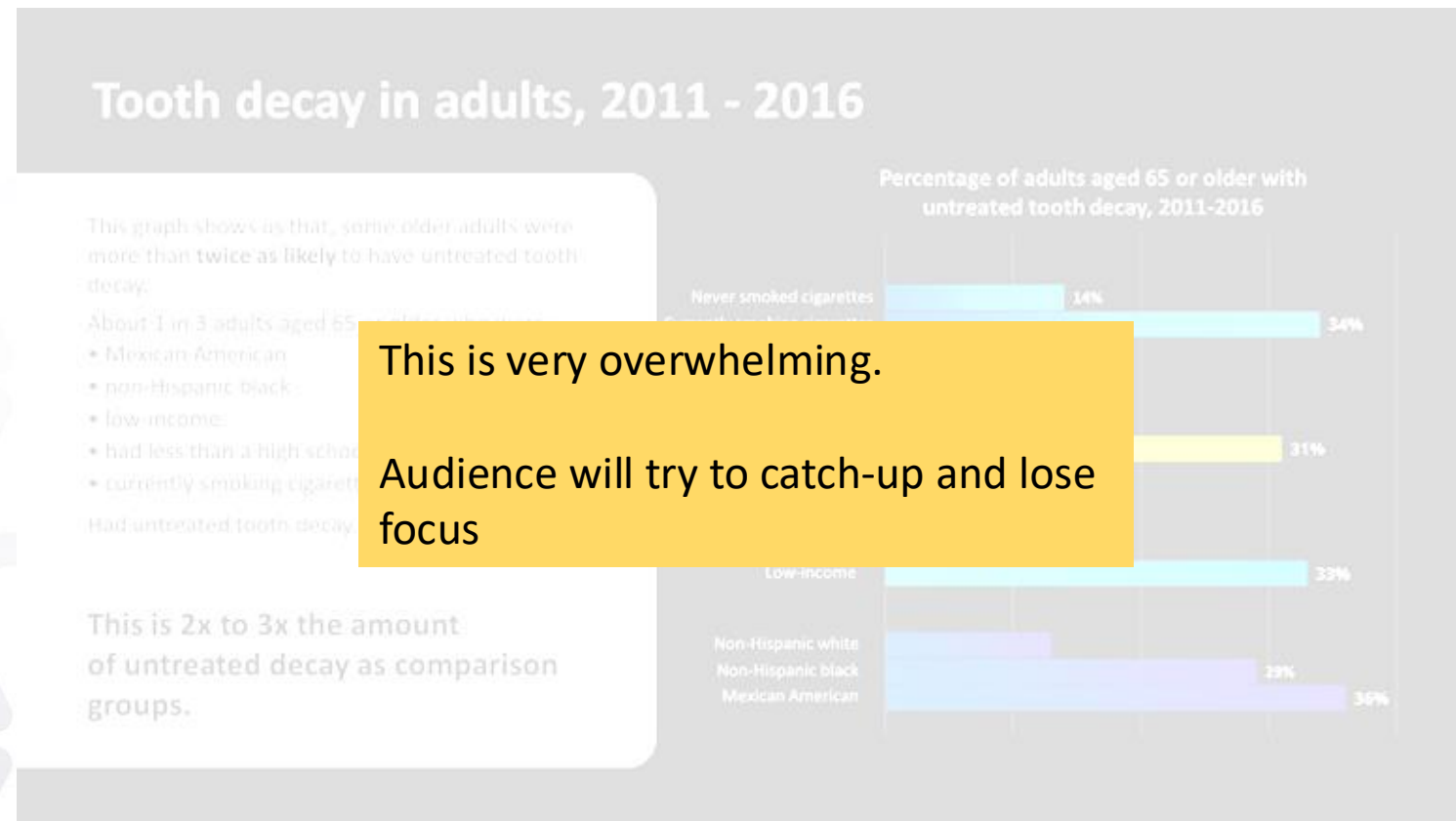
This is 2x to 3x the amount of untreated decay as comparison groups.

Percentage of adults aged 65 or older with untreated tooth decay, 2011-2016



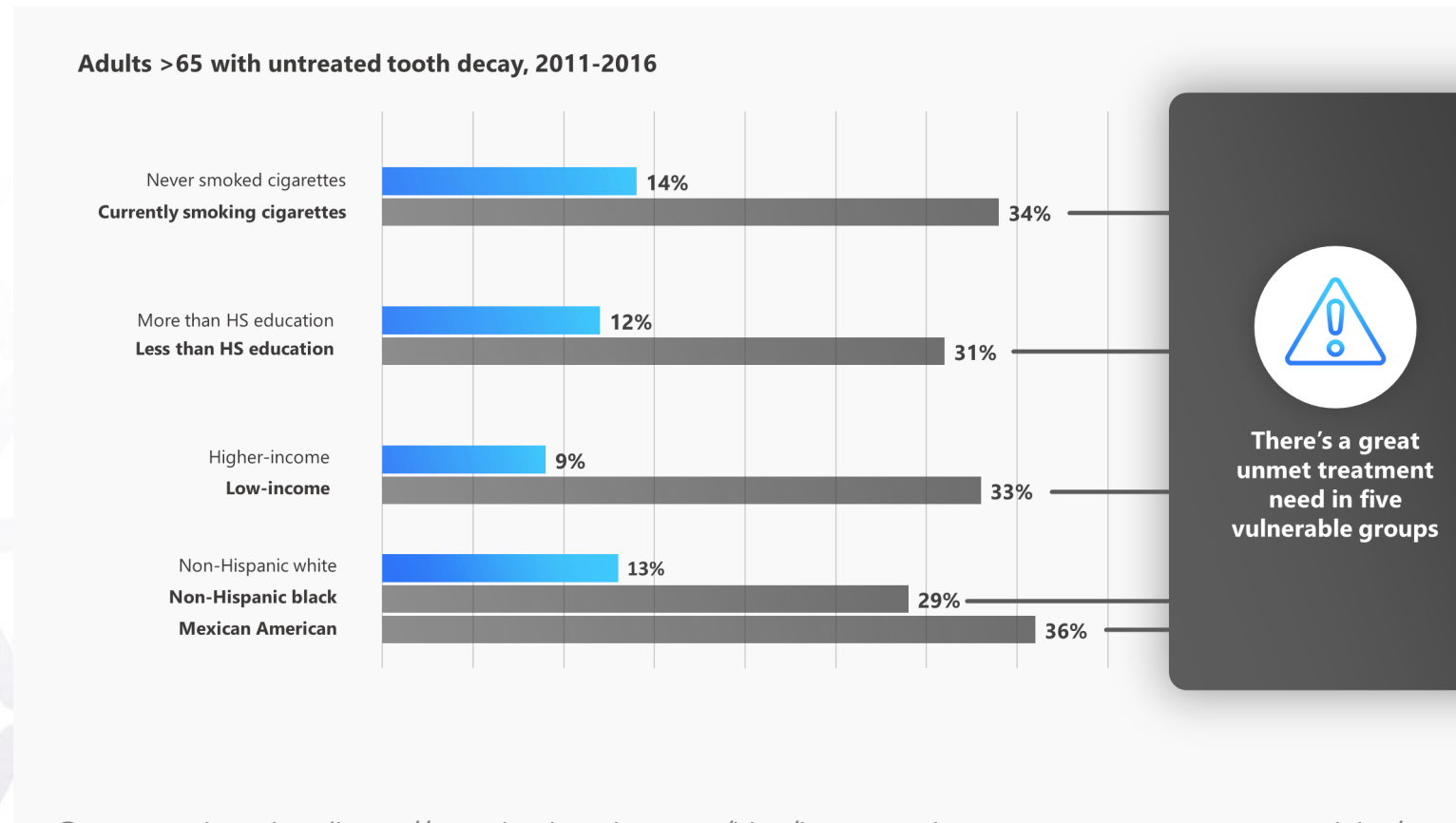
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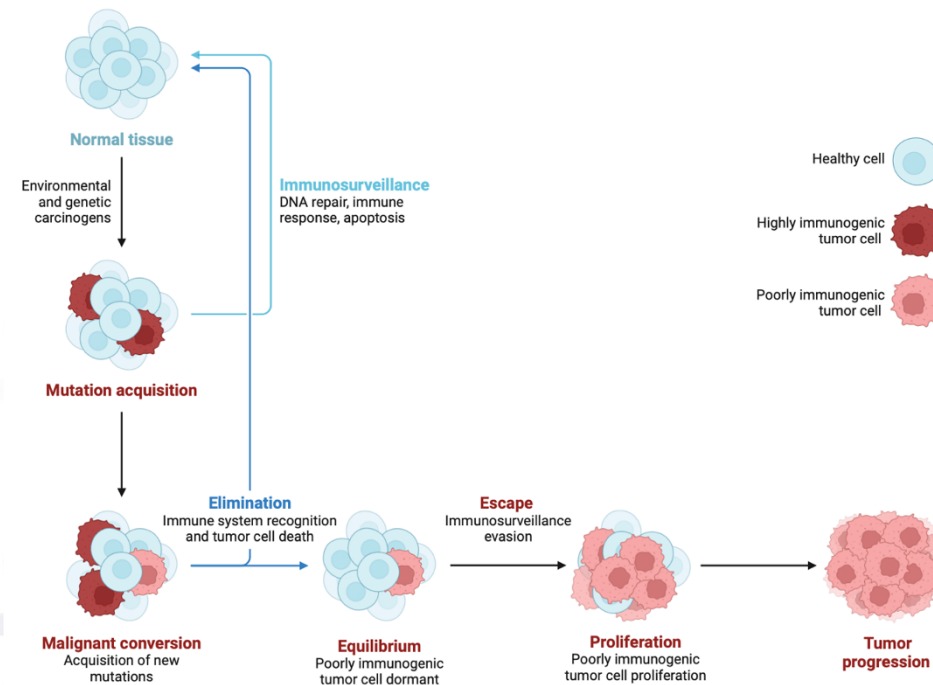
Remove unnecessary details

Move any text that describes what's being shown visually to notes. Say it, don't write it

How to design your presentation

↳ Use simple diagrams

Tumor cells evolve and create an immunosuppressive environment



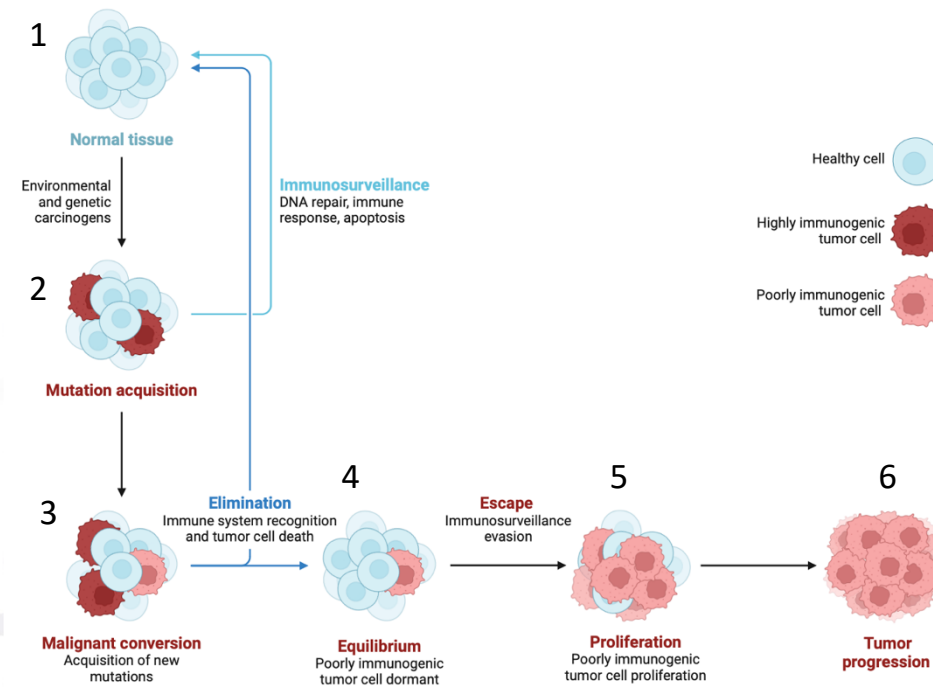
Title states message

Diagram simplifies complex biological process

How to design your presentation

← Signal steps in biological processes

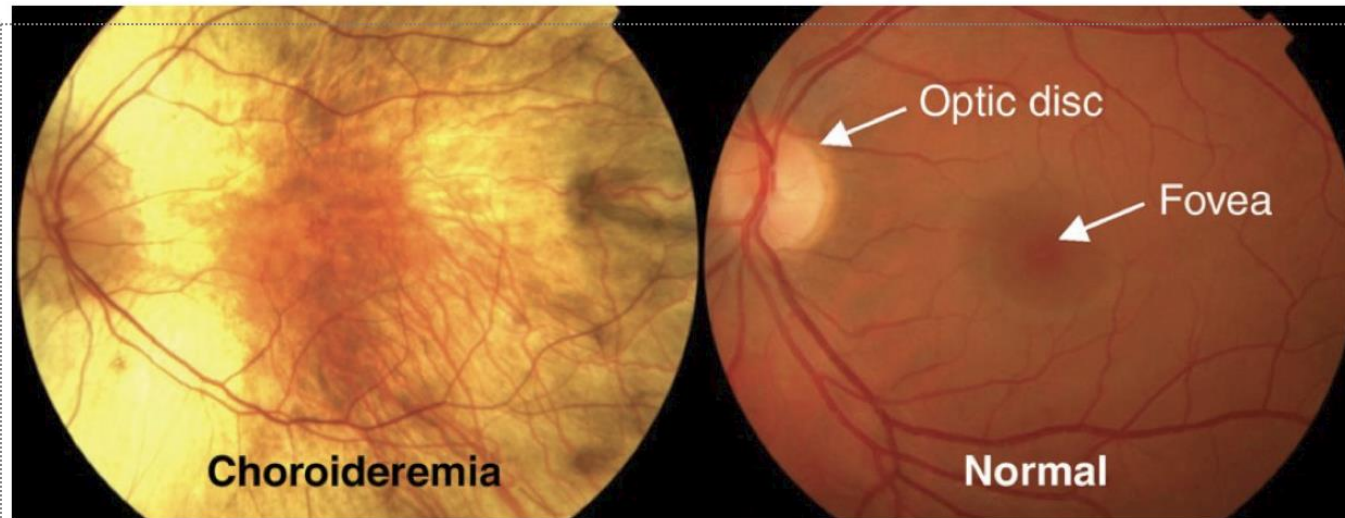
Tumor cells evolve and create an immunosuppressive environment



How to design your presentation

- ↳ Annotate key biological structures

Retinal Photographs show differences between healthy vs Choroideremia patients



Barnard A.R. et al., 2015

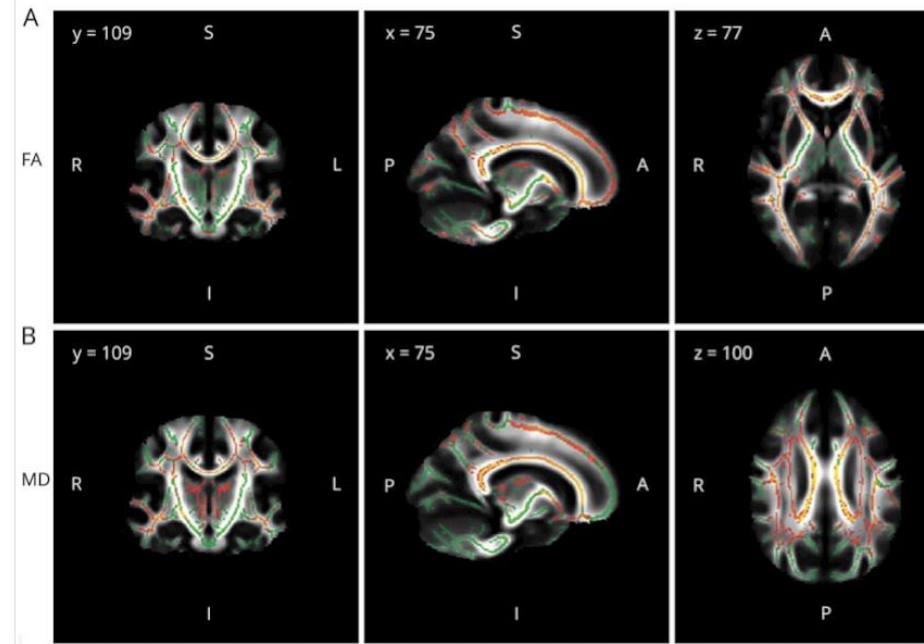
How to design your presentation

↳ Annotate tables and graphs

Results – Figure 1

- MS patients - widespread abnormalities throughout the WM skeleton in both hemispheres defined by significant FA decrease or MD increase

Figure 1 White matter tracts



gradient of significance level red < yellow

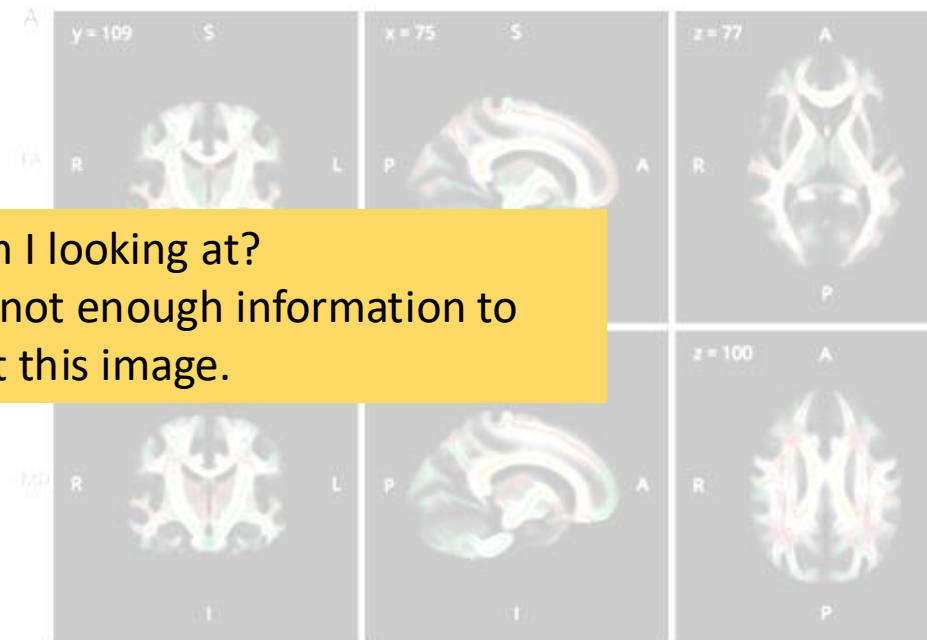
How to design your presentation

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Results – Figure 1

- MS patients - widespread abnormalities throughout WM skeleton in both hemispheres defined by significant FA decrease/increase

Figure 1. White matter tracts



What am I looking at?
There is not enough information to interpret this image.

gradient of significance level red < yellow

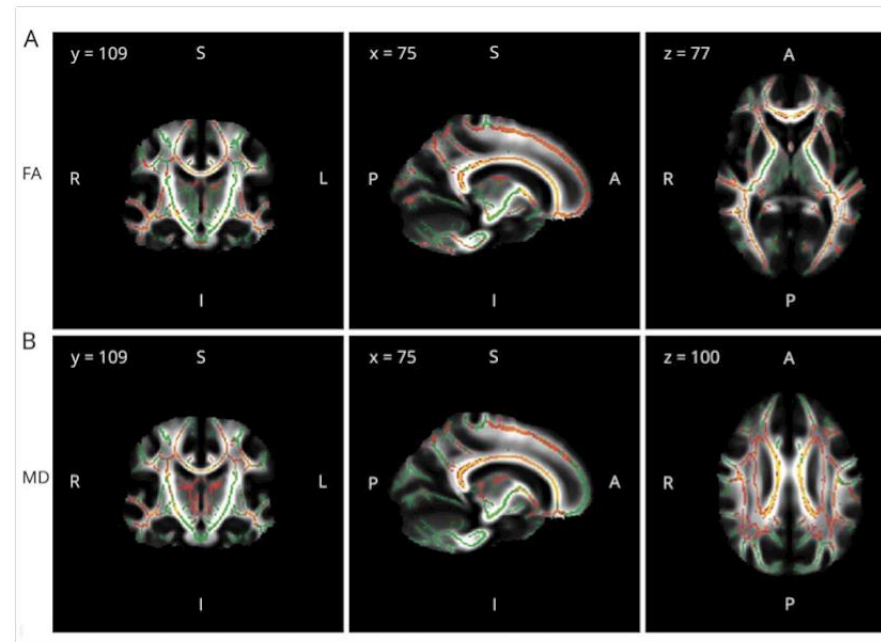
How to design your presentation

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MS patients exhibit widespread abnormalities throughout the white matter skeleton in both hemispheres

White matter tracts with significant fractional anisotropy (FA) reduction in patients with multiple sclerosis relative to healthy controls.

White matter tracts with significant mean diffusivity (MD) increase in patients with multiple sclerosis relative to healthy controls.



Significant regions displayed in red/yellow (gradient of significance level red < yellow).

Title states the message

Caption gives enough information to understand image

How to design your presentation

↳ Use builds to break up information

Research challenges

1. Spatial Dynamics of Immune Cells During Metastasis

- Challenge: Spatial transcriptomics too expensive and with low resolution
- Research Direction: Infer cell types and gene expression by trained ML models on H&E staining images.
- Needs: H&E and scRNA-seq datasets

2. Temporal Dynamics of Immune Cells During Metastasis

- Challenge: Immune cell adaptation and interactions across metastatic stages remain unclear.
- Research Direction: Use mouse models samples in parallel with patients' metastatic tumor samples collected at different time points
- Needs and opportunity: Interaction with clinicians (HSM?)

3. Predicting and Mitigating Immune-Related Adverse Events in Immunotherapy

- Challenge: Immune-based therapies can cause immune-related adverse events where the immune system attacks healthy tissues unpredictably.
- Research Direction: Develop predictive models using multi-omic and clinical data integration to identify high-risk patients and tailor treatments accordingly.

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- *Needs:* H&E and scRNA-seq datasets

2. Temporal Dynamics

- *Challenge:* Immune cell dynamics are complex and hard to track over time.
- *Research Direction:* Use multi-time point samples collected at different time points
- *Needs and opportunity:* Interaction with clinicians (HSM?)

Too much information is distracting and overwhelming

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Adapted from Raquel Romão e Sofia Torres (2024)

Makes it easier for audience to follow along and focus on each challenge

The Devil is in the Details – How much is too much?

- ↪ Remember your audience: What do they want to know?
- ↪ Simplify complex data and concepts: use charts, graphs, and clear explanations
- ↪ Check for understanding and adapt: gauge audience reactions and adapt on the spot if you must

Referencing your sources

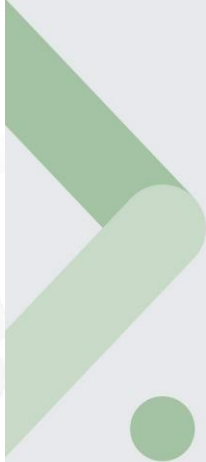
← Cite key studies, but don't overload slides with text

In-text citations and reference list at the end



Literature Review

"The largest known economic impact of climate change is upon agriculture because of the size and sensitivity of the sector. Warming causes the greatest harm to agriculture in developing countries primarily because many farms in the low latitudes already endure climates that are too hot."
Smith, J. (2018)



References/Bibliography

1. Smith, J. (2018). "The Impact of Climate Change on Global Agriculture." *Journal of Environmental Economics and Management*, 45(2), 217-230.
2. Johnson, L., & Anderson, R. (2020). "The Role of Technology in Modern Education." *Educational Technology Research and Development*, 32(4), 541-556.
3. Garcia, M., & Patel, S. (2019). "Understanding Consumer Behavior in the Digital Age." *Journal of Marketing Research*, 28(3), 301-315.
4. Brown, K., & Jones, P. (2017). "Corporate Governance Practices and Firm Performance: A Meta-Analysis." *Journal of Business Ethics*, 19(1), 89-104.
5. Williams, A., & Smith, D. (2016). "The Impact of Leadership Styles on Organizational Culture: A Case Study Analysis." *Leadership Quarterly*, 24(2), 175-190.

Referencing your sources

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In-text citations footnotes



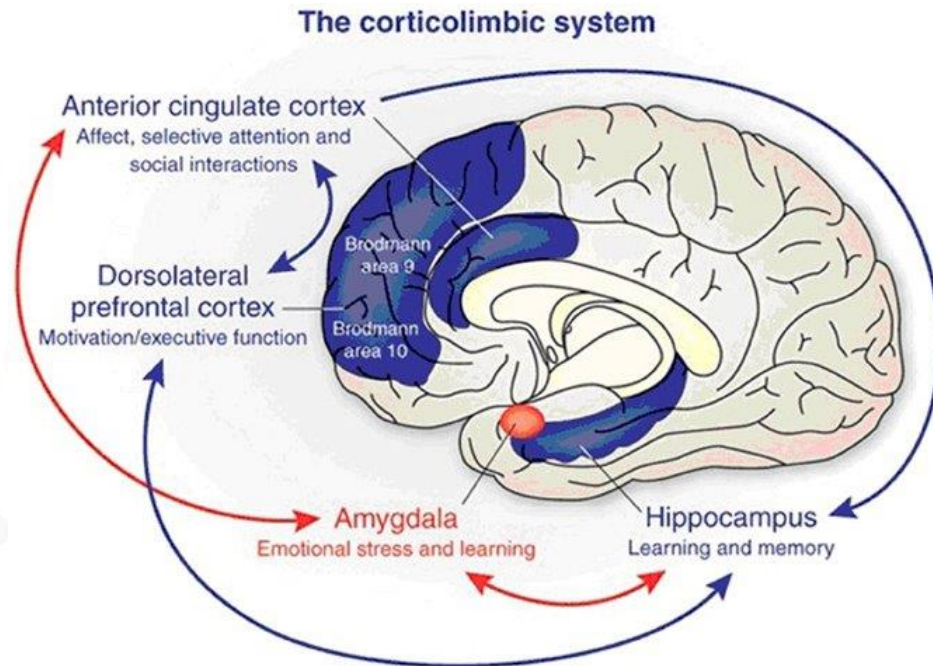
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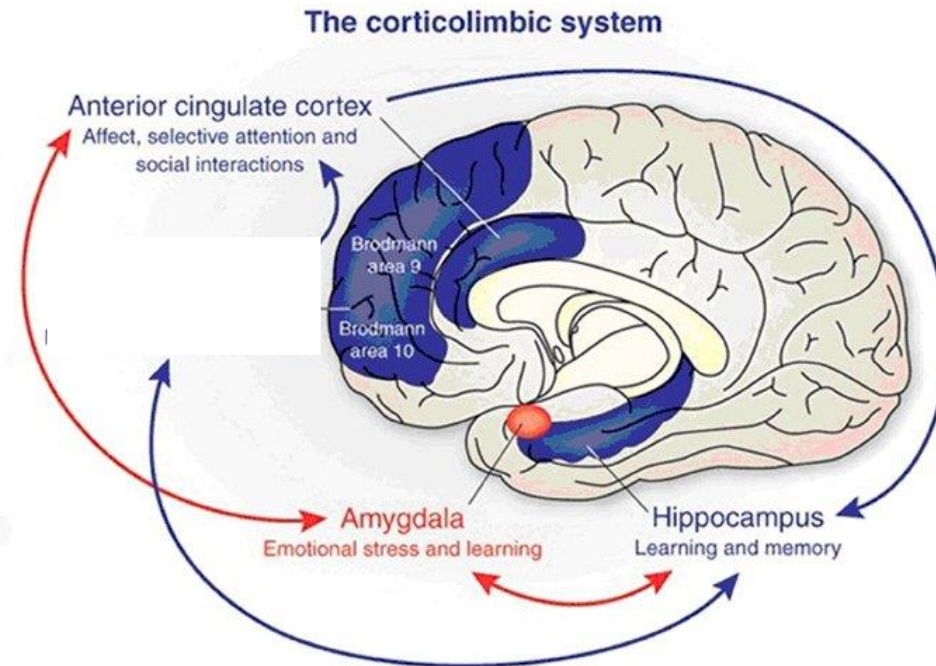
¹Smith, J. (2018) "The impact of Climate Change on Global Agriculture." Journal of Environmental Economics and Management, 45(2), 217-230

Referencing your sources

↪ Images should have references too (unless it's copyright free)



G. Leisman et al, Frontiers in Integrative Neuroscience (2012)



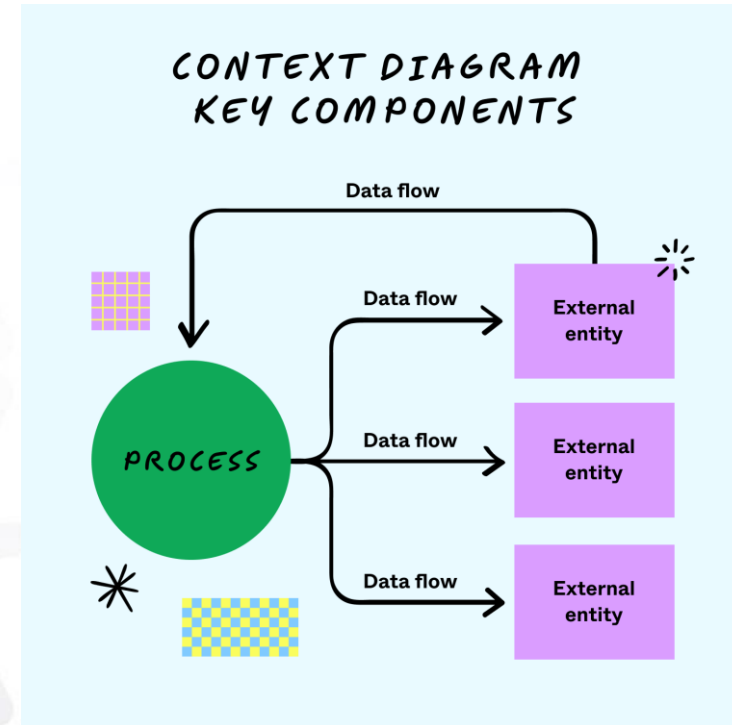
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Referencing your sources

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[Castle Stalker](#) © Andrea Mucelli,
[CC BY-NC-SA 2.0](#)



Figma, "Context Diagram Key Components"
<https://www.figma.com/resource-library/context-diagram/>

Referencing your sources

← Use Further Reading slide IF necessary

Further Reading

- Applied Logistic Regression
David W. Hosmer & Stanley Lemeshow, 1989,
John Wiley and Sons Inc.
- Applied Regression Analysis and Other Multi-
variable Methods, Kleinbaum Kupper and Muller
1988, Wadsworth publishing
- Neural Networks for Pattern Recognition
Christopher M. Bishop, 1995, Oxford University
press

Scripts

Pros

- Useful for highly technical talks
- Ensure you stick to the time

Cons

- Can make you sound robotic
- If you forget a word, you will forget everything

Scripts

Pros	Cons
<ul style="list-style-type: none">• <u>Useful</u> for <u>technical</u> <u>talks</u>• <u>Ensure</u> you <u>save</u> <u>time</u>	<ul style="list-style-type: none">• <u>Doesn't</u> <u>sound</u> <u>natural</u>• <u>Without</u> <u>the</u> <u>right</u> <u>word</u>, <u>you</u> <u>lose</u> <u>everything</u>

Best approach

Use key points rather than memorizing a whole text

Delivery

“I suspect that whatever cannot be said clearly is probably not being thought clearly either”

Peter Singer in *Ethics in the Real World: 82 Brief Essays on Things That Matter* (2016)

Delivery - Body language

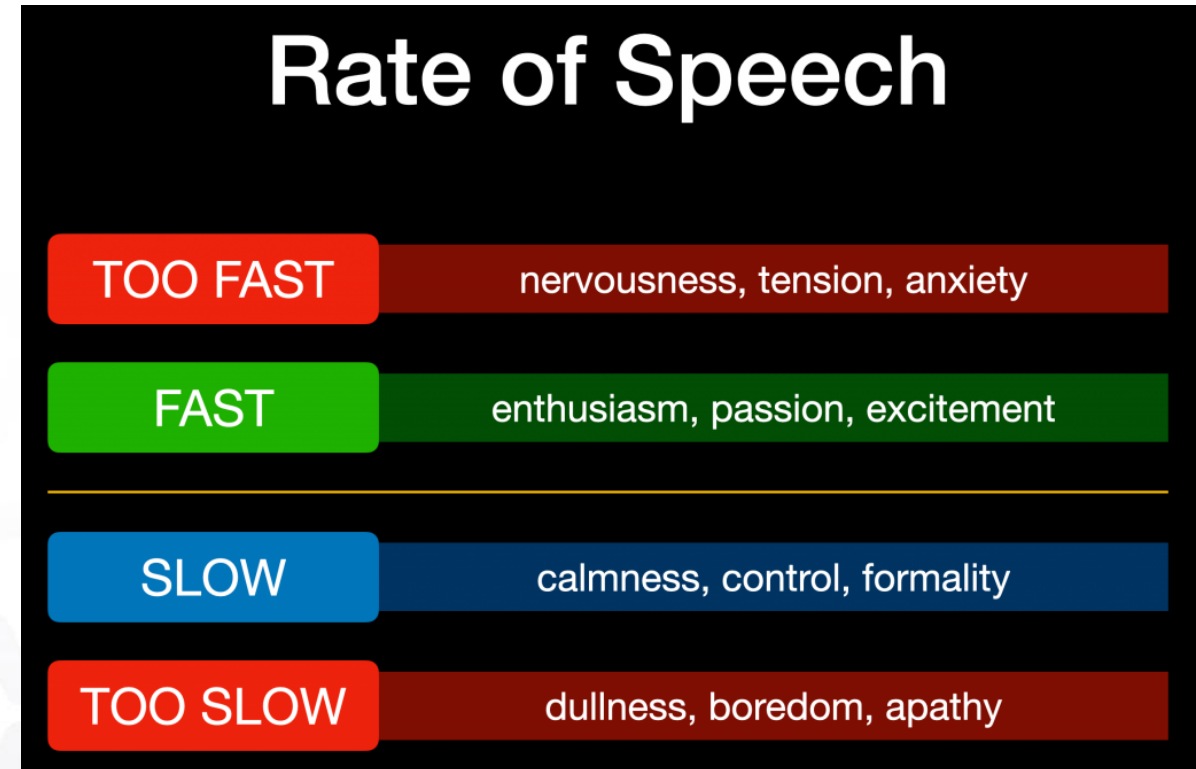
- < Maintain regular eye contact;
- < Move around
- < Make sure your audience sees your face as much as possible



Amy Marcopulos, The Lowell, <https://thelowell.org/8472/opinions/practice-makes-perfect-overcoming-my-fear-of-public-speaking/#>

Delivery – Tone and Speed

- ↪ Vary your volume and speed to emphasize most important points
- ↪ Make sure your audience can hear you, but also don't yell
- ↪ DO NOT speak too fast (breathe)



Claudio Sennhauser, <https://sennhauser.com/rate-of-speed/>

Delivery - Language

For Experts:

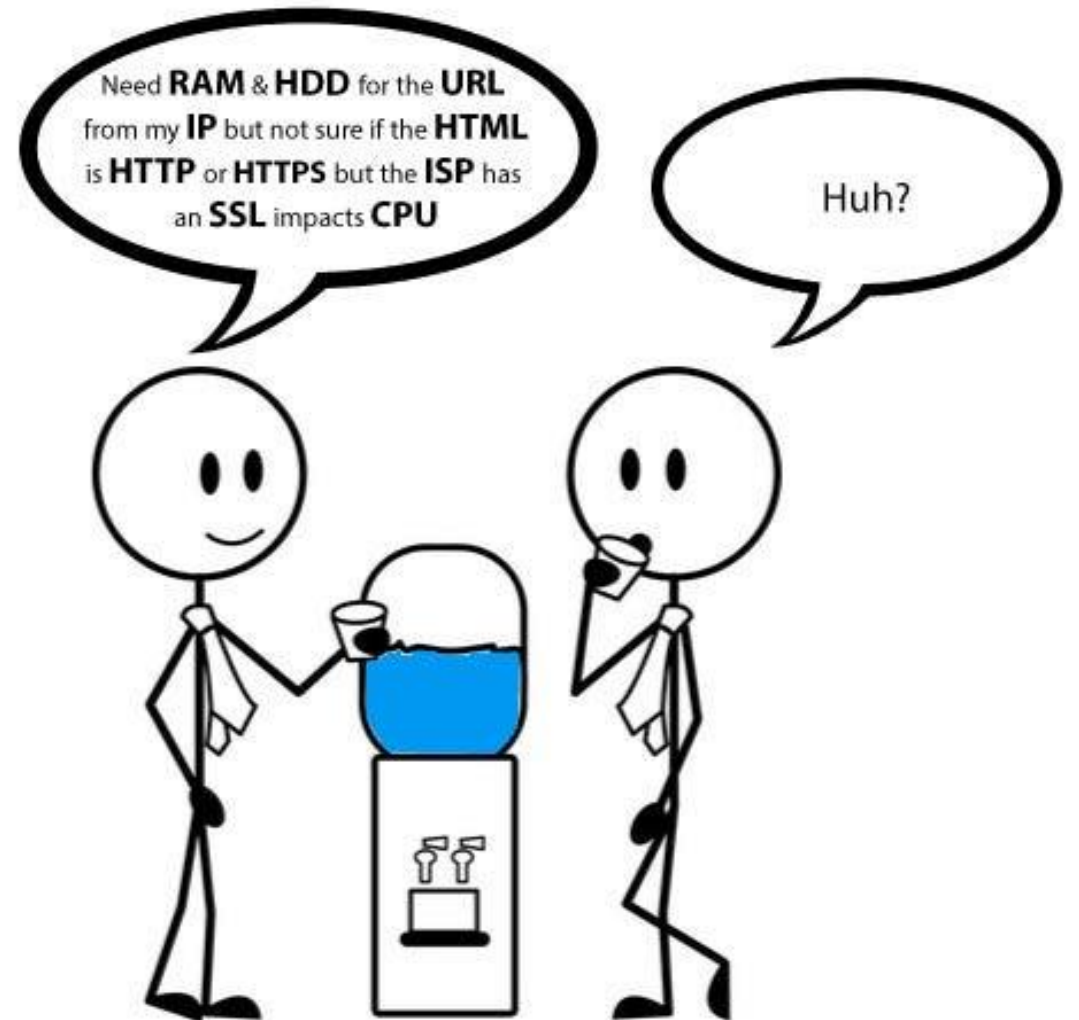
- > Use **technical terms**, but only when necessary
- > Assume **background knowledge**
- > Focus on **novelty, evidence, and accuracy**



Delivery - Language

For Non-Specialists:

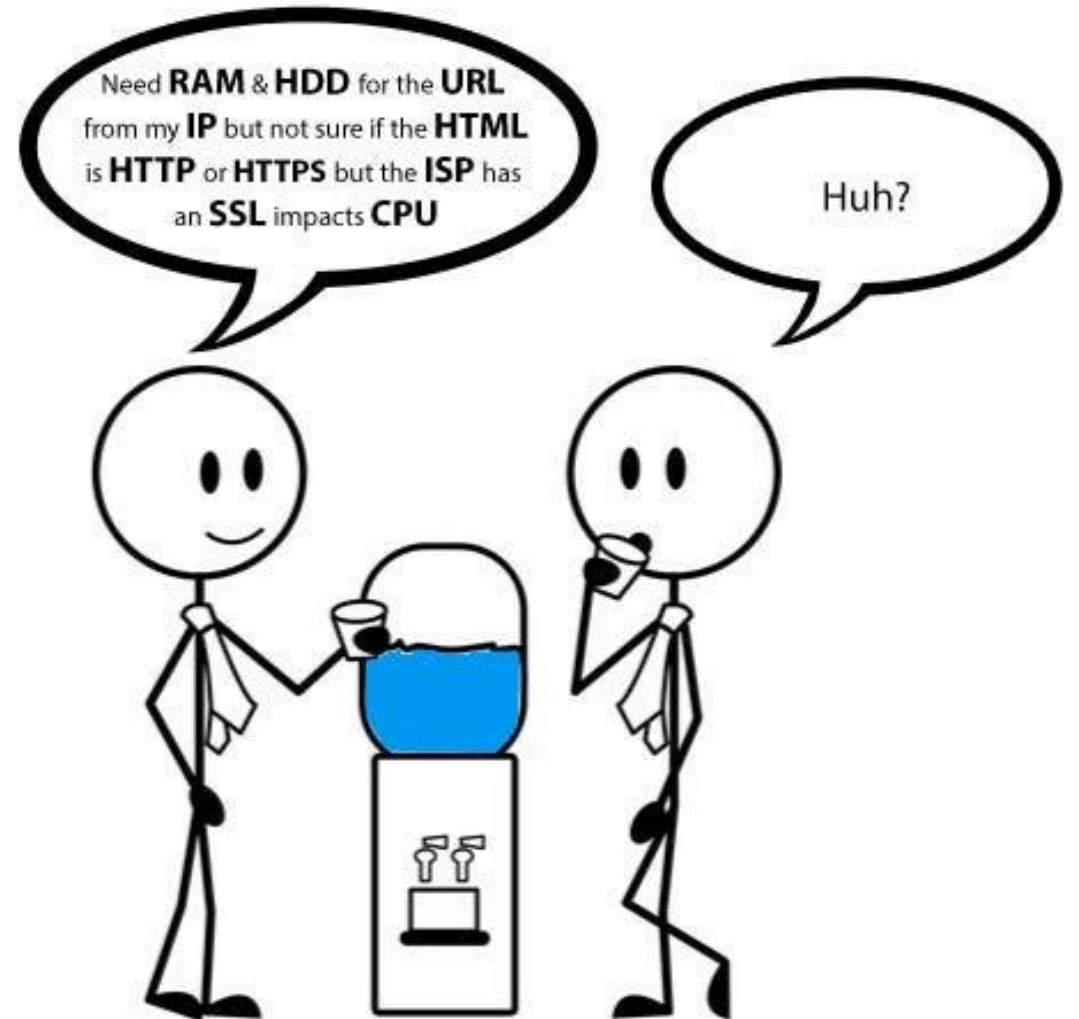
- > Simplify jargon or replace with everyday language
- > Use **analogies and examples**
- > Define key terms clearly (**but don't over-explain everything**)



Delivery - Language

For Mixed Audiences:

- < Start with **simpler explanations**, then add depth
- < Use **visuals** to bridge knowledge gaps
- < Allow for **questions** to gauge understanding



Handling difficult questions

- ↪ Prepare in advance:
 - ↪ know what you're talking about!
 - ↪ Anticipate possible questions
- ↪ Stay calm and remember your 3 main points



Handling difficult questions

- < Take a moment before answering: “Let me consider the best way to answer that”
- < If you are unsure, be honest: That would be interesting to find out, but I don’t know the answer. Thank you for raising the question.” OR “Off the top of my head...”
- < When you disagree with the question: “It seems we think differently. Maybe we can talk more later.”



Final Exercise

- ↪ Prepare presentation based on your poster (or improve retreat presentation)
- ↪ Deliver 10 min presentation
- ↪ Answer questions from your audience



Thank you!