Objectives of the session:

- Discuss the strategies you use to keep students engaged and active in your classes.
- Discuss how storytelling can be used in the classroom.
- Watch a short video about peer instruction. Discuss the pros and cons of using it in your classes.
- Digital tools at your disposal in CentraleSupélec.

Advantages of Chunking your course

Improved Comprehension and Retention

Enhanced Focus and Engagement

Facilitates active learning

Better Feedback and Assessment

Reduced Cognitive Load

Easier Revision and Review

Storytelling

The First Day of Class

What are the objectives of your first class other than the learning outcomes?

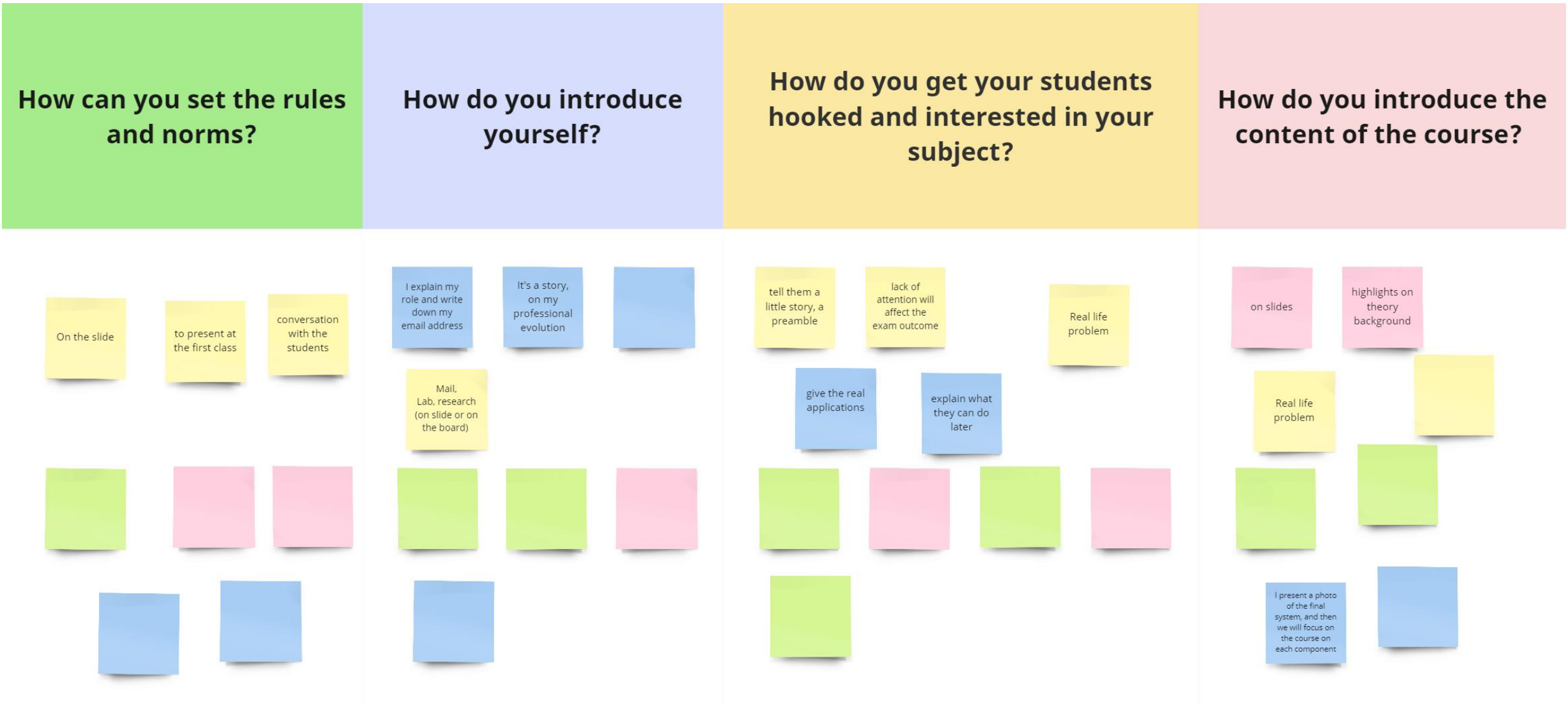
introduce myself and the team course information. organisation of the exam.

let students understand guiding rules and agree with them/ comment them

make the students understand that you are approachable/available

Get them interested in the subject you're about to teach

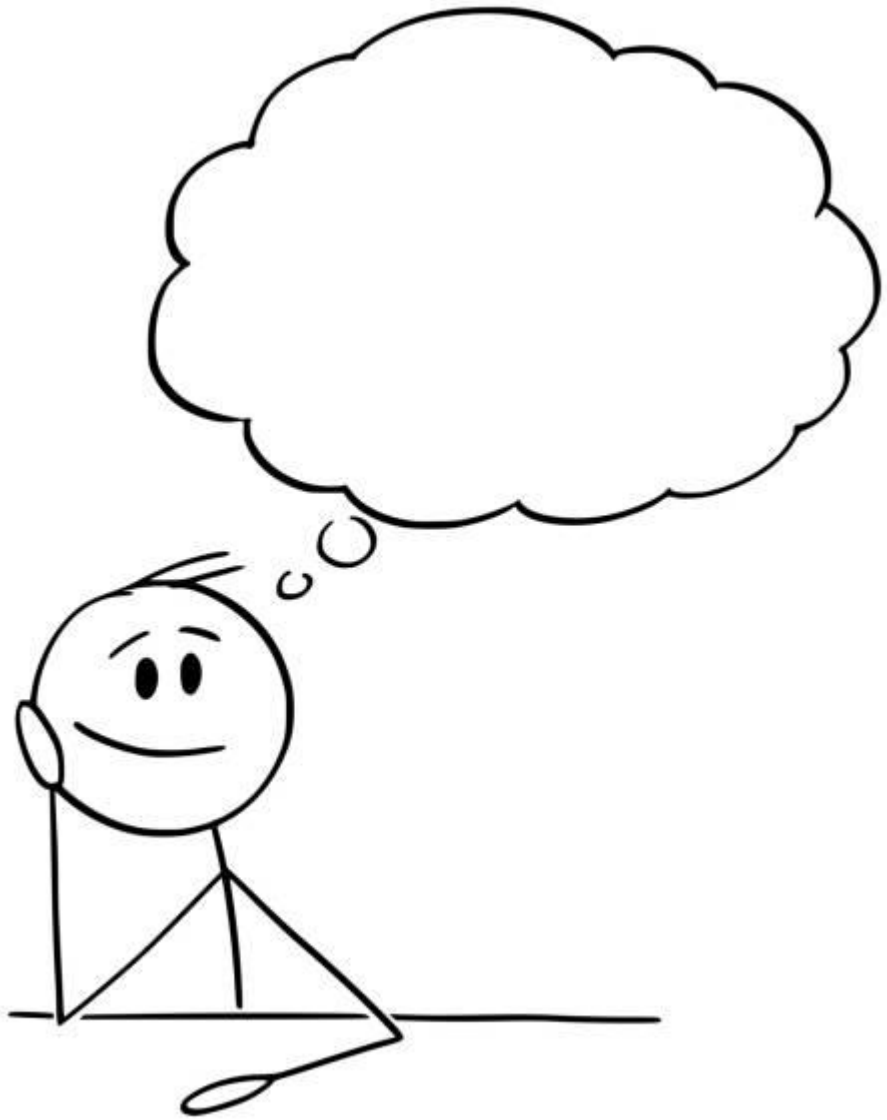
The First Day of Class



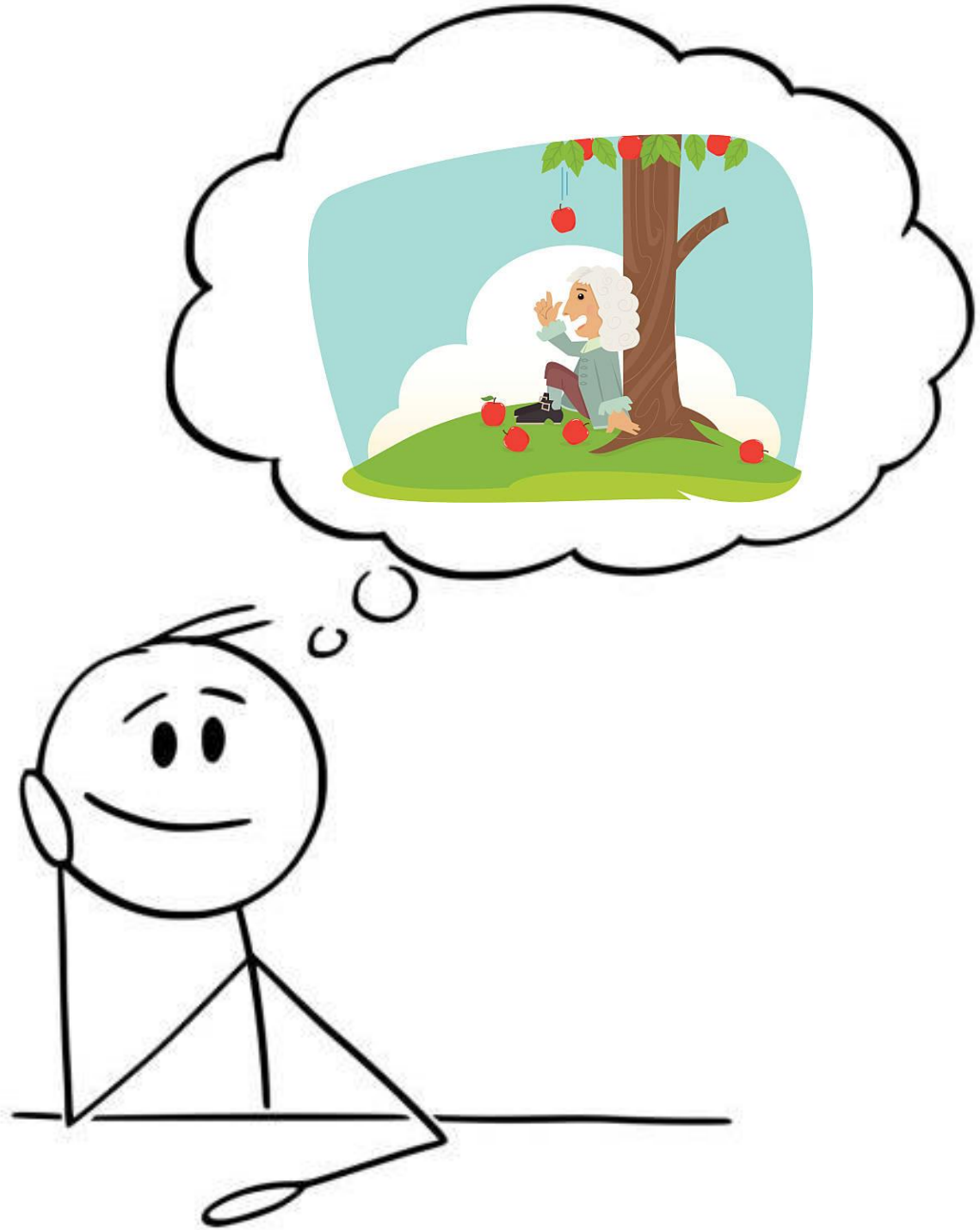
Connecting with your students through

storytelling

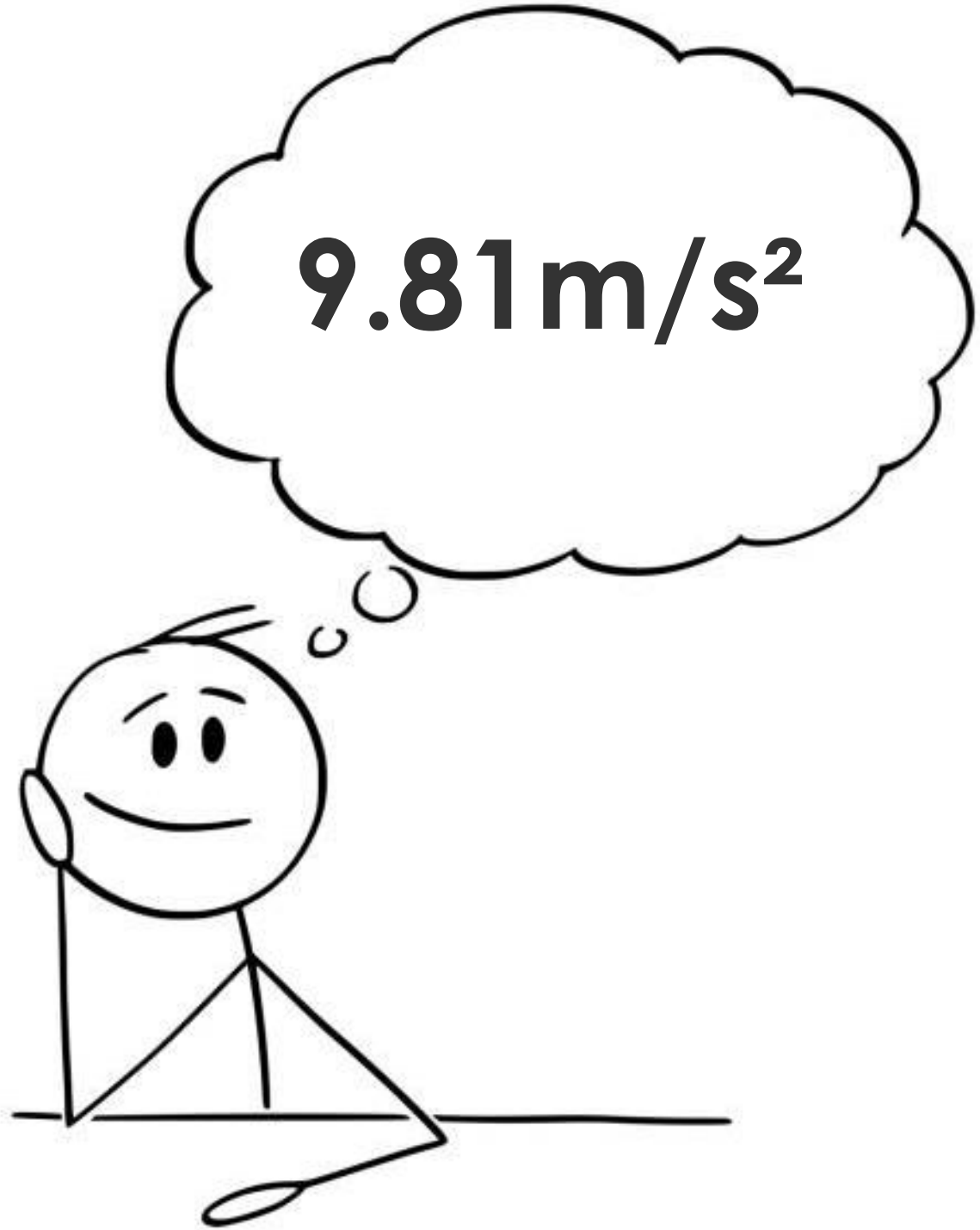
Earth gravity



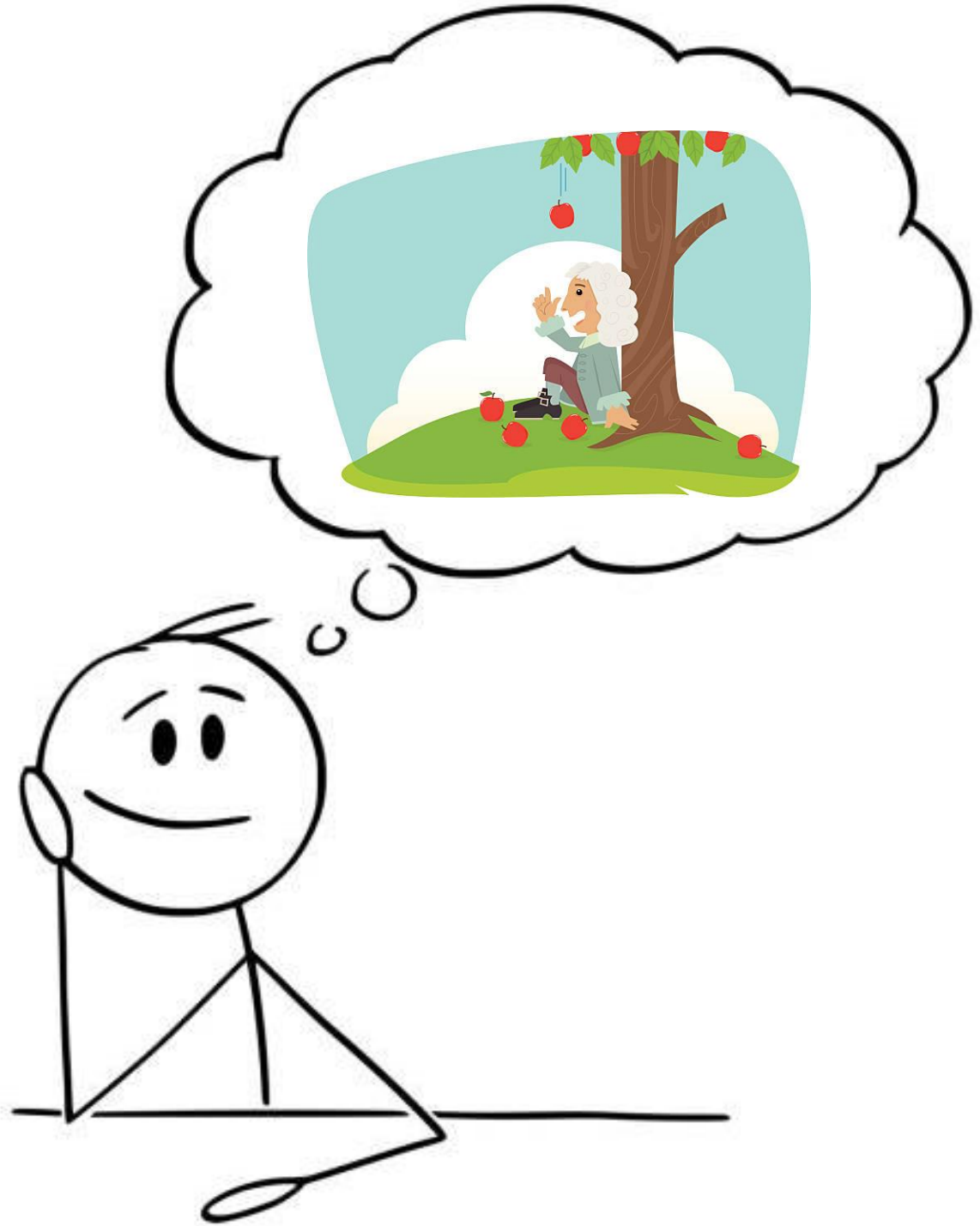
Earth gravity



Earth gravity



Earth gravity



How do I go about building my story?

1) Who are my students?

1) Who are my students?

2) What is the goal of the story?

1) Who are my students?

2) What is the goal of the story?

- connect
- motivate
- teach

Connect with the learners

Brief personal story

Motivate them to action

Someone who benefited or could have benefited from the knowledge or skill you are teaching

Stories can

introduce the origin of a problem (anecdote)

give background information

say how something has developed

give concrete examples

Stories can

introduce the origin of a problem

give background information

say how something has developed

Stories can

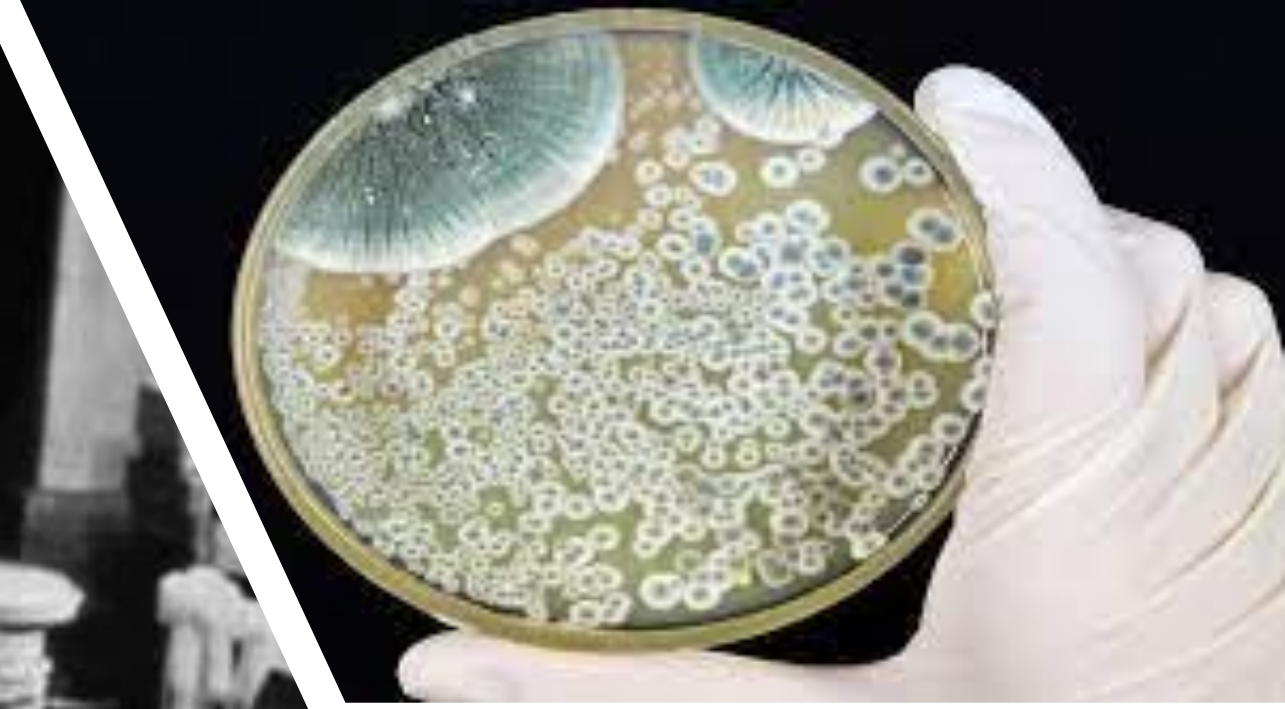
introduce the origin of a problem

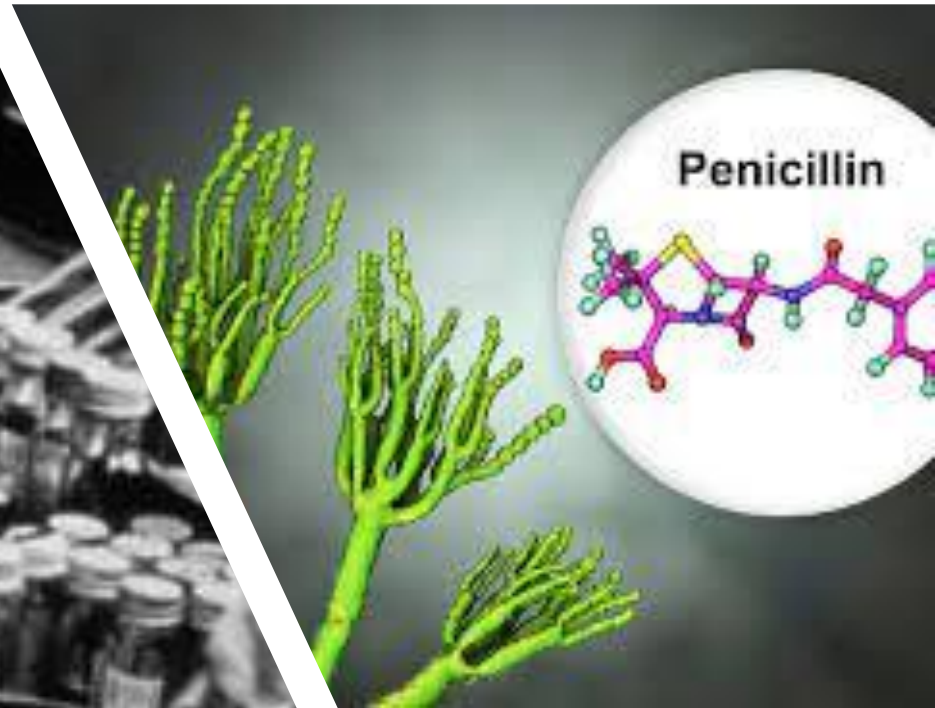
give background information

say how something has developed

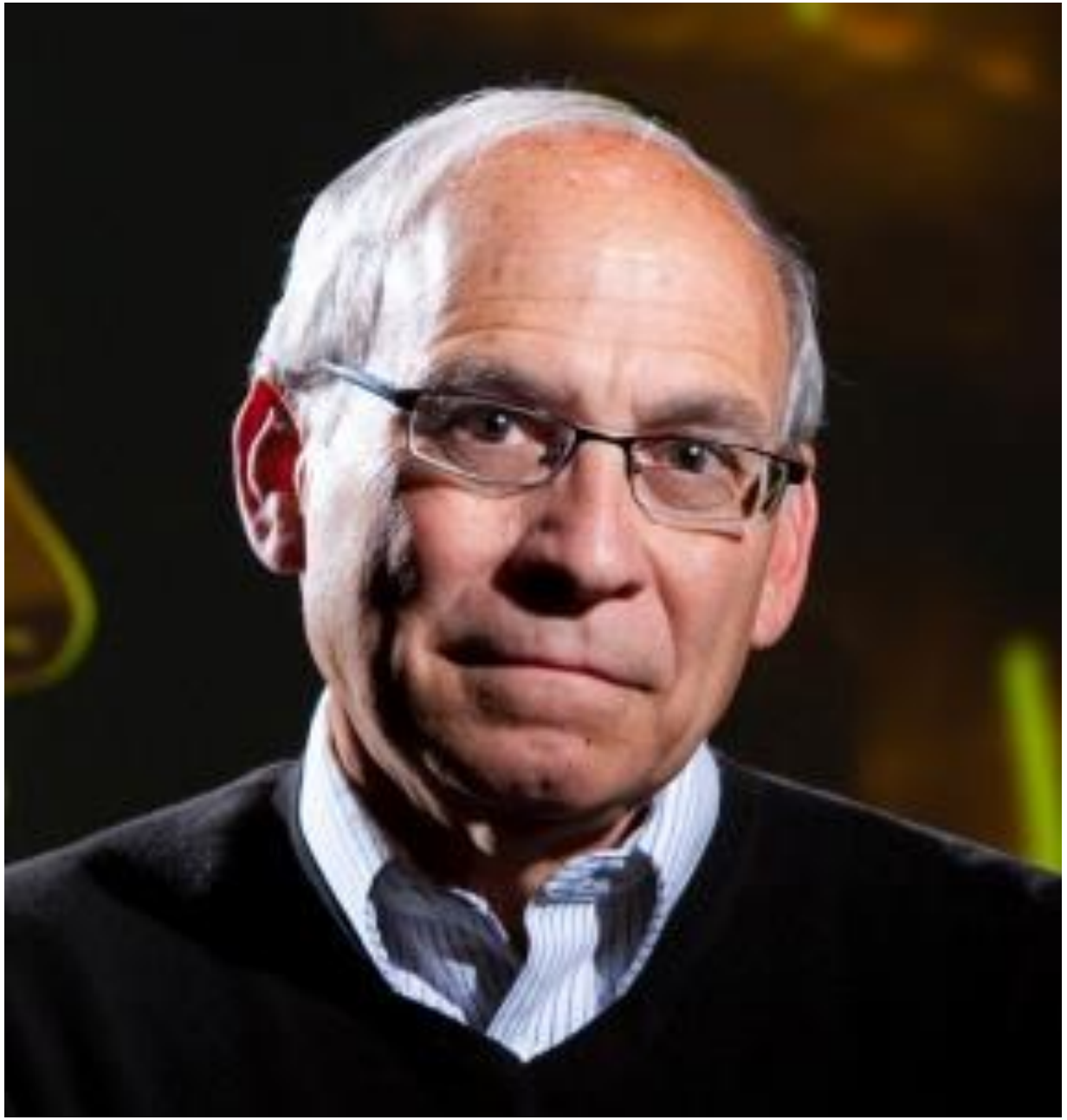
give concrete examples

describe a success or a failure





describe a success or a failure



Richard E. Mayer

active learning environment

listening to a story involves a high level of cognitive engagement

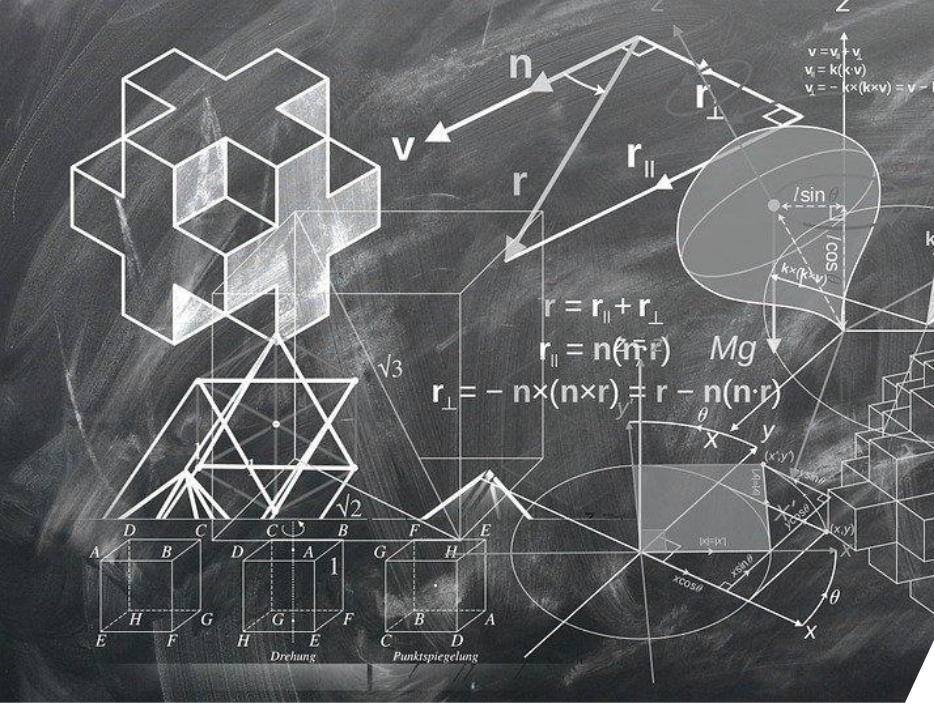
Real-world situations

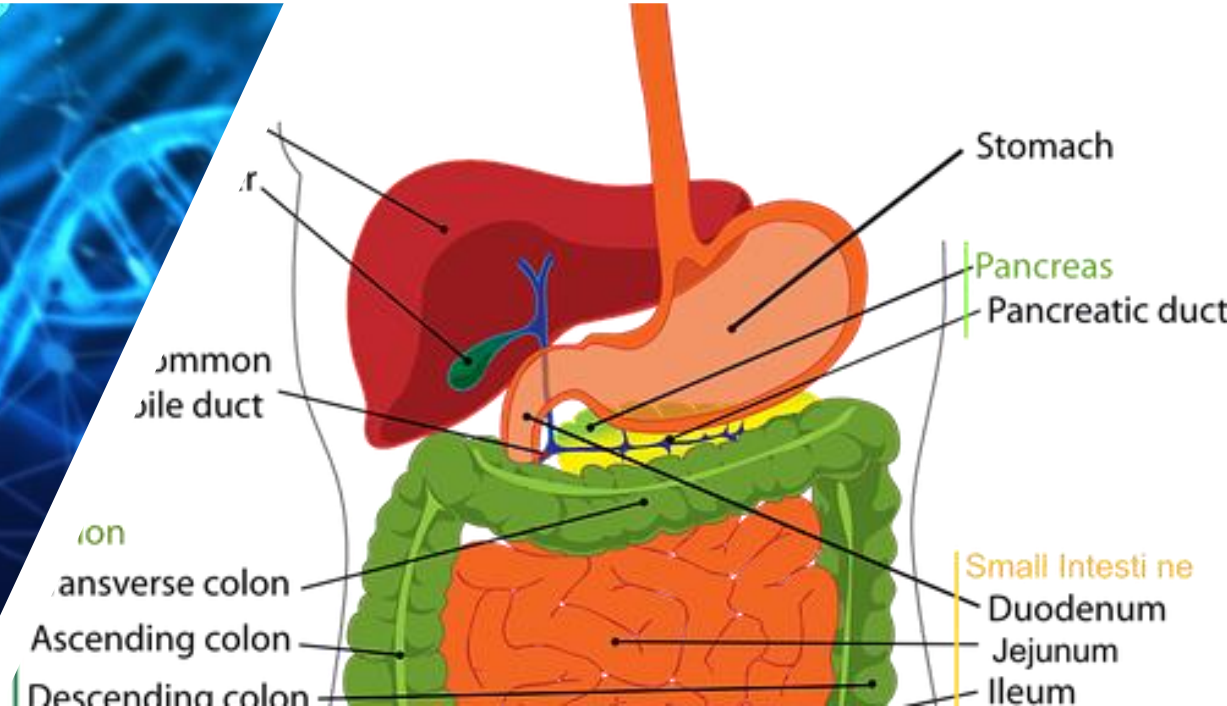
Concrete context

Learn on their own

They figure out what to do

Reveal what really happened at the end


n
v
r
$r_\perp$
$r_\parallel$
$r = r_\parallel + r_\perp$
$r_\parallel = n(n \cdot r)$
$r_\perp = -n \times (n \times r) = r - n(n \cdot r)$
Mg
√3
√2
Drehung
Punktspiegelung


Stomach
Pancreas
Pancreatic duct
Small Intesti ne
Duodenum
Jejunum
Ileum
ansverse colon
Ascending colon

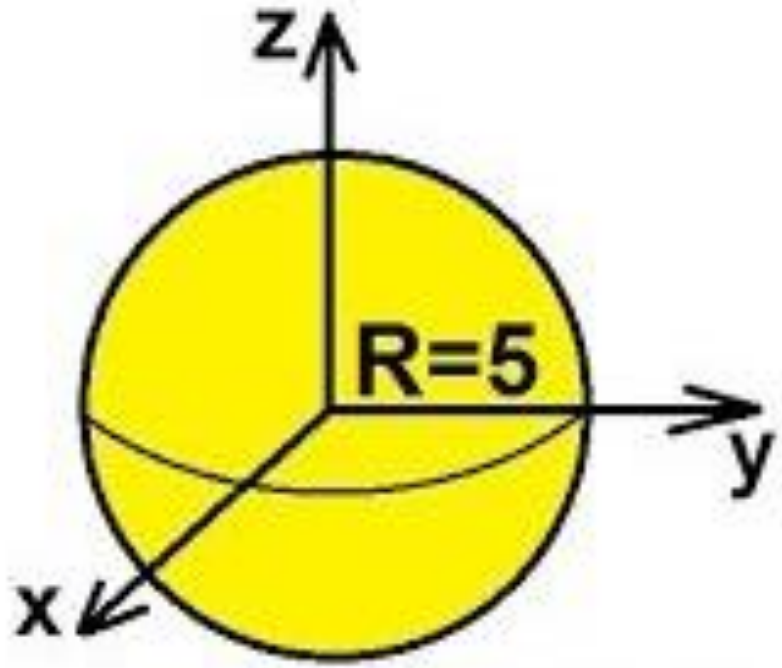
Finding the Triple Integral: Ex. 2

$$\iiint (x^2 + y^2 + z^2)^2 \, dV$$

$$= \int_{\phi=0}^{\pi} \int_{\theta=0}^{2\pi} \int_{\rho=0}^{5} \rho^4 \, \rho^2 \sin\phi \, d\rho \, d\theta \, d\phi$$

$$\vdots$$

$$= \frac{312{,}500\pi}{7}$$

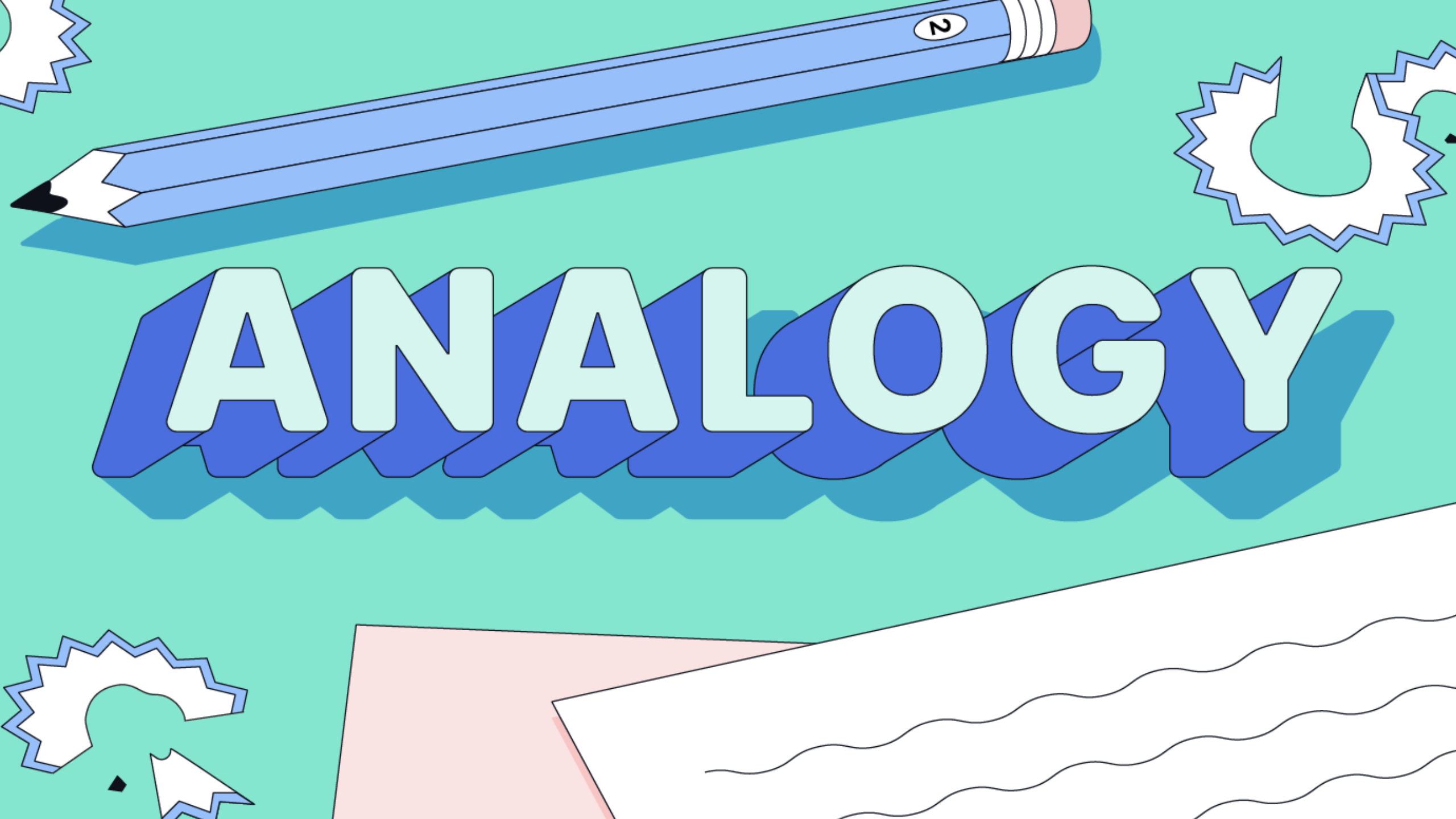


$$\rho = x^2 + y^2 + z^2$$

$$dV = dx\,dy\,dz$$

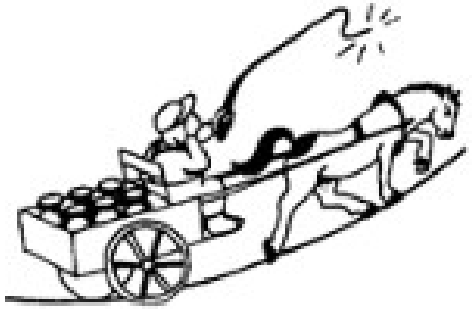
$$dV = \rho^2 \sin\phi \, d\rho \, d\phi \, d\theta$$


Numberphile


ANALOGY

Ways To Treat Heart Failure

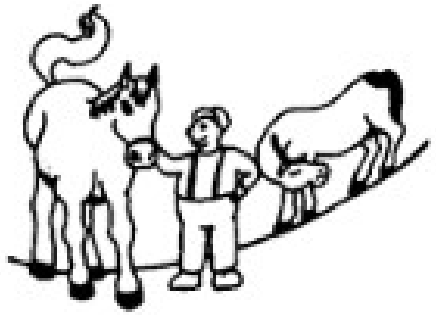
A. Whip the horse - ie Digoxin, Adrenaline, Milrinone etc
B. Unload the Wagon - Diuretics ie Furosemide
C. Slow the Horse - Beta Blockers
D. Get a New Horse - Heart Tranplant
E. Get a tractor - Ventricular Assist Device
F. Heal the Horse - A bit of everything + Tender loving Care



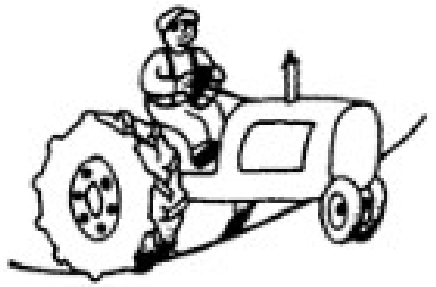
WHIP THE HORSE

UNLOAD THE WAGON

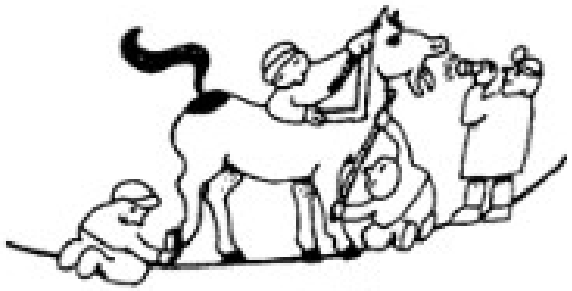
SLOW THE HORSE



GET A NEW HORSE



GET A TRACTOR



HEAL THE HORSE

Image courtesy Heart Physiology: From Cell to Circulation: Lionel H. Opie Lippincott Williams & Wilkins, 2004

The Feynman Technique

Choose a concept the students will be curious about

Reflect, Refine, and Simplify

Organize and Review

Can you explain it to a 12-year-old?

The curse of knowledge/expertise

Teachers teach from their perspective

Use of over-complex language

Cram too much information

“The definition of genius is

taking the complex and making it simple

(… but not simpler)”

Albert Einstein

Learning preferences

Honey, P. and Mumford, A. (1986a) *The Manuel of Learning Styles*, Peter Honey Associates

- Activists
- Reflectors
- Theorists
- Pragmatists

Activists

Theorists

Pragmatists

Reflectors

Activists

Group Projects: Organize group projects where students can brainstorm, collaborate, and solve problems together.

Lab Experiments: Conduct lab sessions that involve practical, hands-on experimentation.

Simulations and Role-Playing: Use engineering simulations or role-playing scenarios to immerse students in real-world situations.

Exercises: give students exercises where they have to apply the concepts and interact with the other students.

Reflectors

Case Studies: Present detailed case studies that students can analyze and discuss in-depth.

Peer Reviews: Implement peer review sessions where students can give and receive feedback, allowing time for reflection.

Homework and reading: Give students homework that will allow them to reflect on what was done in class. Provide extra reading and articles.

Slides, lecture notes or scripts: Give students access to the slides and the lecture notes before the class.

Group Discussions: Facilitate structured group discussions where students can listen to different viewpoints and consider them carefully.

Theorists

Rich literature and materials: provide resources that explain the theory

Lectures with Conceptual Frameworks: Provide lectures that focus on theoretical frameworks, principles, and models.

Research Projects: Assign research projects that require in-depth study and the development of theories.

Debates: Hold debates on theoretical approaches or engineering methodologies, encouraging analytical thinking.

Problem-Solving Sessions: Organize sessions where students can apply theoretical knowledge to solve complex problems.

Pragmatists

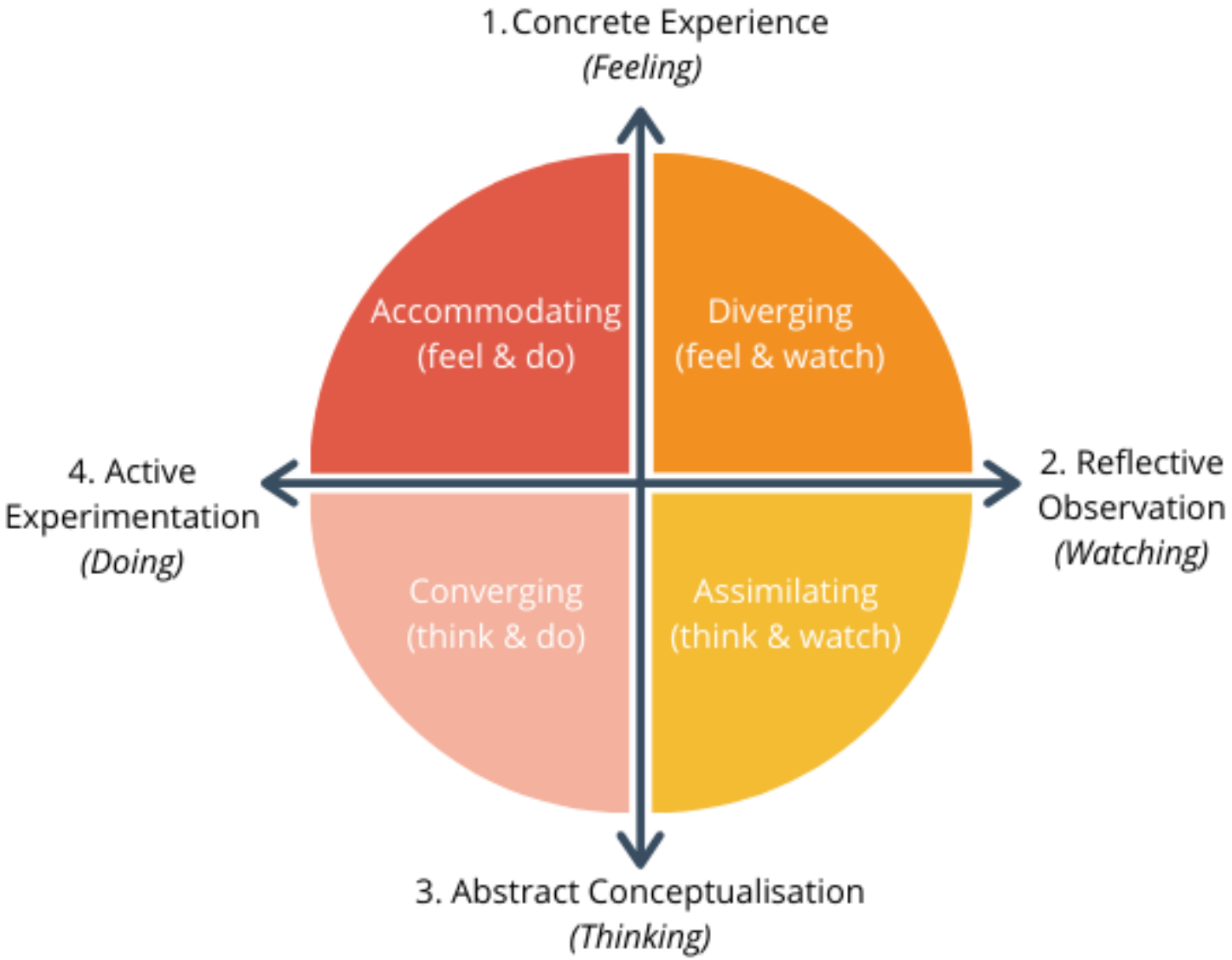
Case Studies with Practical Applications: Use case studies that focus on practical, real-world engineering problems and solutions.

Guest Lectures from Industry Professionals: Invite professionals to discuss how theoretical knowledge is applied in their work.

Project-Based Learning: Implement project-based learning where students work on real-world projects that require practical application of their knowledge.

Industry Visits: Arrange visits to engineering firms or industrial sites to see engineering principles in action.

Kolb's Learning Cycle



Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development* (Vol. 1). Englewood Cliffs, NJ: Prentice-Hall.

Peer instruction

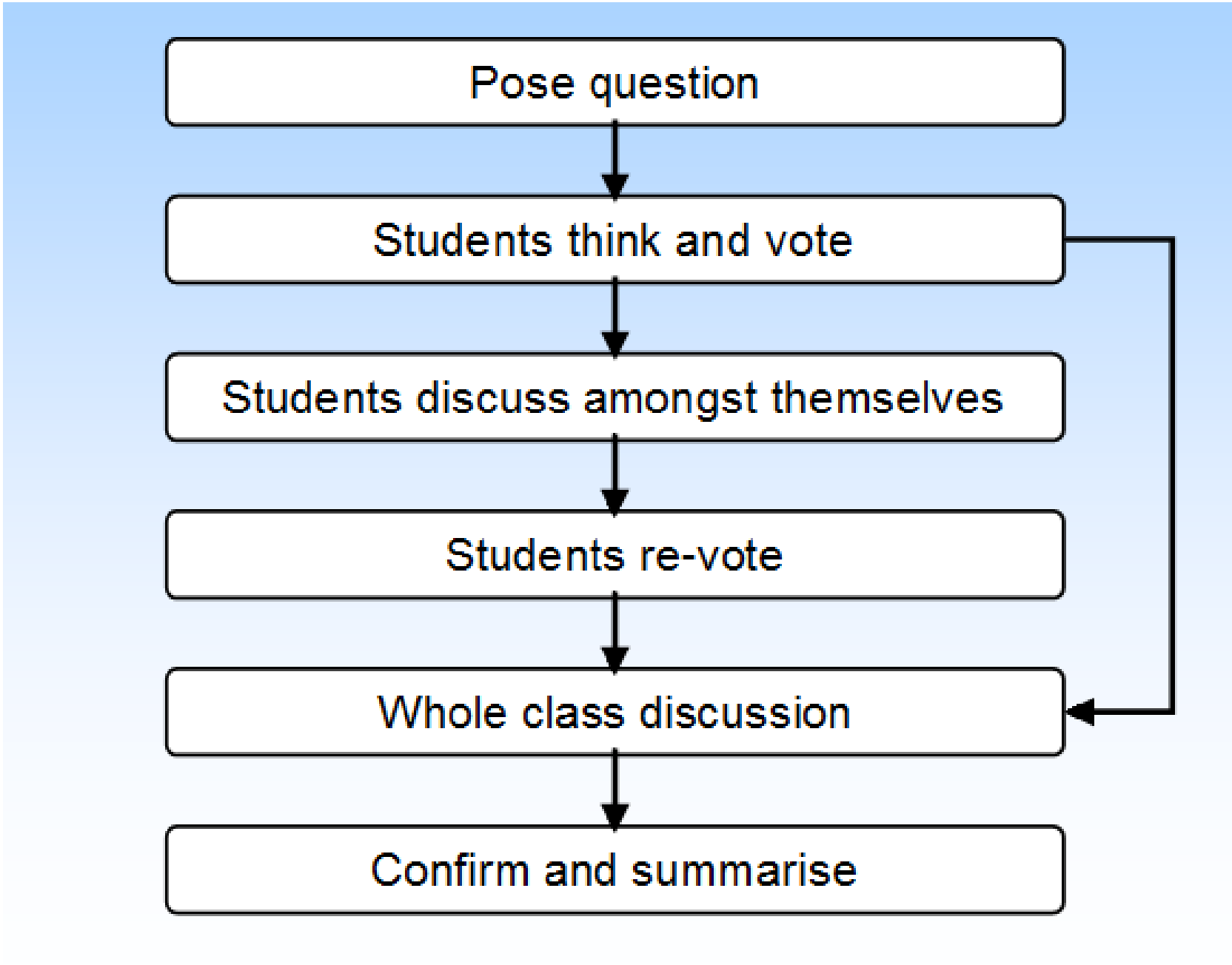
« We are innately social beings and that we are wired to connect with others, and this need is even more fundamental than our need for food and shelter. »

Matt Lieberman, UCLA

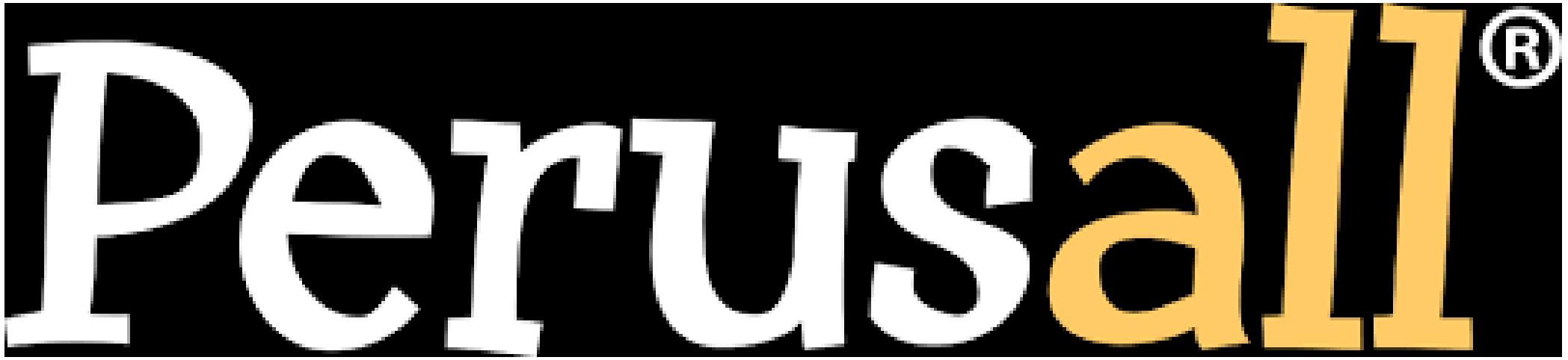
“success [in learning] depends less on materials, techniques and analyses, and more on what goes on inside and between the people in the classroom”.

Earl Stevick


provided I have a good text.


Pose question
Students think and vote
Students discuss amongst themselves
Students re-vote
Whole class discussion
Confirm and summarise


think
pair
share



https://perusall.com/

2. Say how long it will last

3. State the learning objectives. Learning objectives are broad statements written from an instructor's perspective that give the general content and direction of a learning experience. What will the students be able to do once they have completed the course? How will they apply the skills and competencies to other fields? The learning goals aren't necessarily observable or measurable.

4. State what the student will be able to do (and what they are expected to do) at the end of the course (learning outcomes). It can be useful to think about the assignment (backward design) they should be able to complete at the end of the course to identify the learning outcomes. A learning outcome describes, in observable and measurable terms, what a student is able to do as a result of completing a learning experience. To find out more on learning outcomes and learning objectives visit: https://resources.depaul.edu/teaching-commons/teaching-guides/course-design/Pages/course-objectives-learning-outcomes.aspx

   To write the learning outcomes, many professors like to use Bloom's Taxonomy. The verbs associated with each step in the Taxonomy can help define learning outcomes. To find out more about Bloom's Taxonomy visit: https://www.celt.iastate.edu/teaching/effective-teaching-practices/revised-blooms-taxonomy/

5. Do you expect your students to have some prior knowledge of the subject?

6. How will you be delivering this course? Will it be in person, in a classroom or will it take place online?

7. Will the classes be synchronous or asynchronous?

8. Will the course be blended or flipped? If yes, which virtual learning space will you be using (Moodle, Edunao, Miro board, Google Classrooms, Perusall, etc.)?

Put all this information in the table below :

You Course

1. Title of the course

2. Duration

Current conversation

DL I don't understand the difference between learning outcomes and learning objectives.

Jan 19 12:32 pm

DL Here is a website that clarifies the difference between learning outcomes and learning objectives.

Not yet submitted: press Enter to submit. Submit

First of all, you'll start with the course as a whole :

1. Give your course a title
2. Say how long it will last
3. State the learning objectives. Learning objectives are broad statements written from an instructor's perspective that give the general content and direction of a learning experience. What will the students be able to do once they have completed the course? How will they apply the skills and competencies to other fields? The learning goals aren't necessarily observable or measurable.
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Put all this information in the table below :

You Course

1. Title of the course

First of all, you'll start with the course as a whole :

1. Give your course a title
2. Say how long it will last
3. State the learning objectives. Learning objectives are broad statements written from an instructor's perspective that give the general content and direction of a learning experience. What will the students be able to do once they have completed the course? How will they apply the skills and competencies to other fields? The learning goals aren't necessarily observable or measurable.
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Put all this information in the table below :

You Course

1. Title of the course

Visuals

We are visual beings

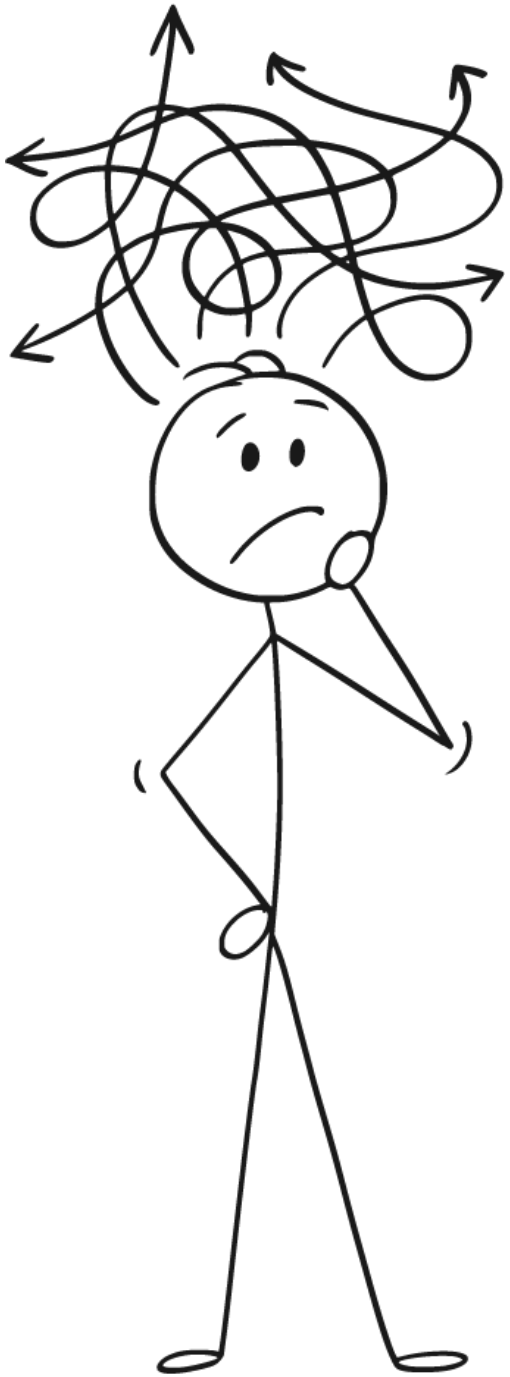
90% of the information we take in every day is visual

We process images 60,000 times faster than text

Emotion in an instant

Cross language barriers

BUT



Distract

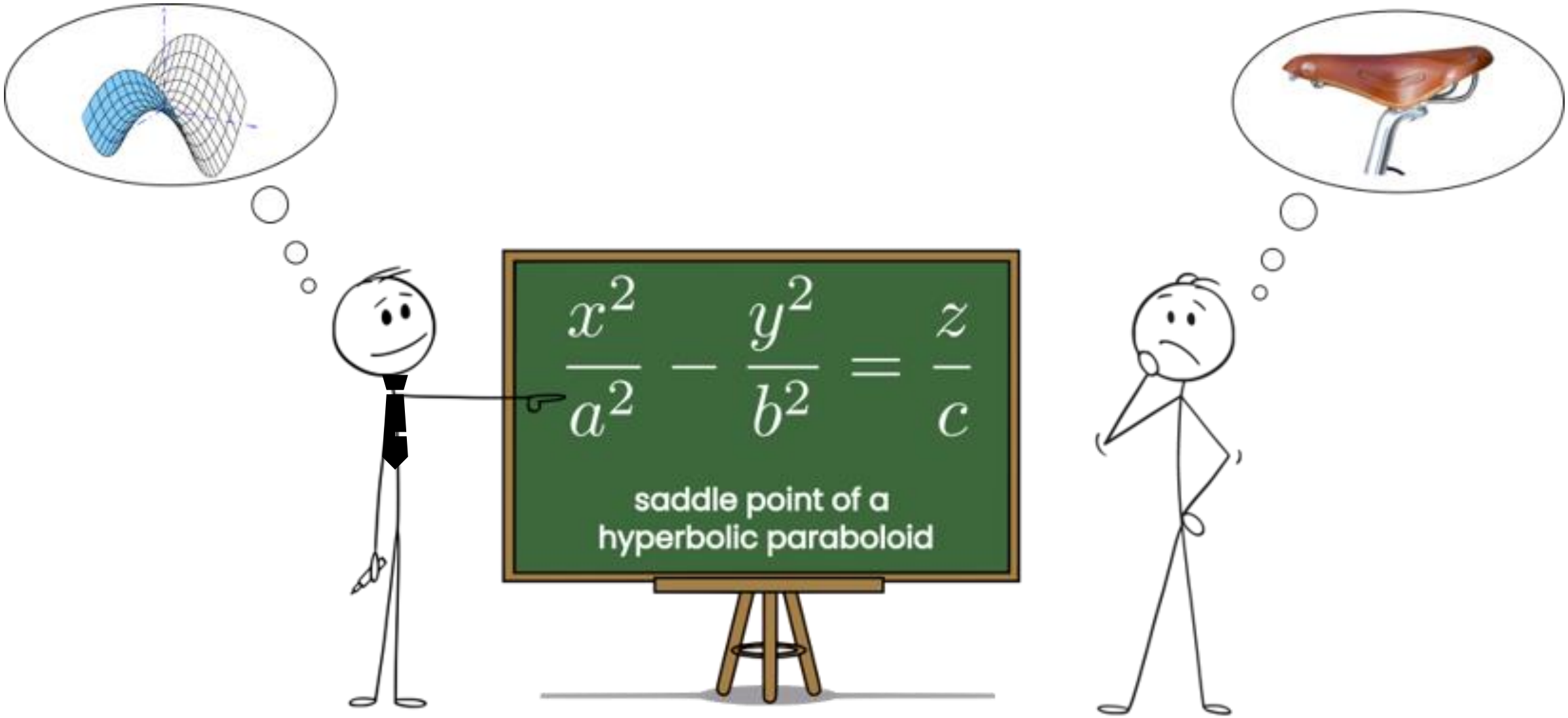
Confuse

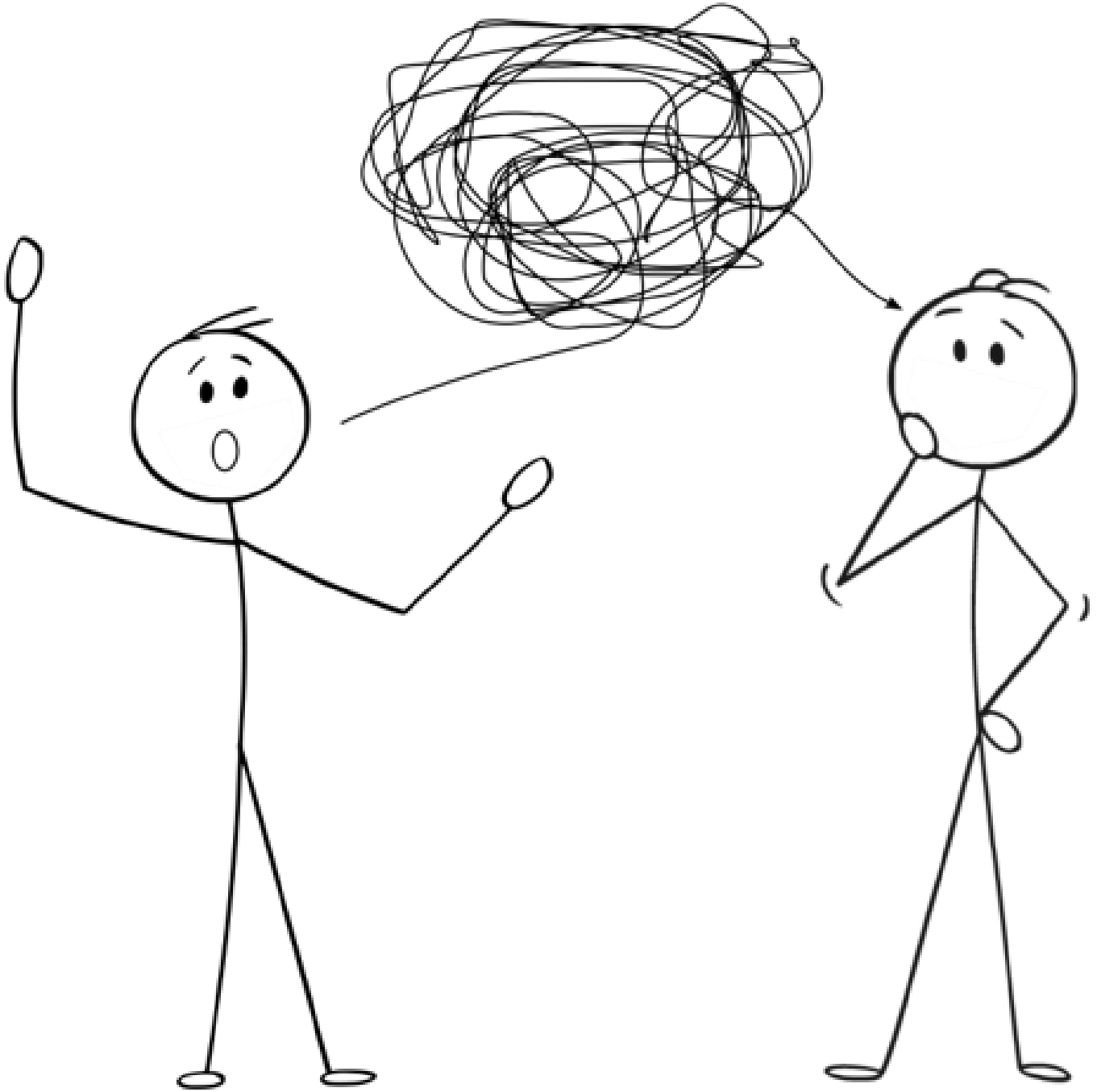
Take up space

“The single biggest problem in communication is the illusion that it has taken place”

George Bernard Shaw

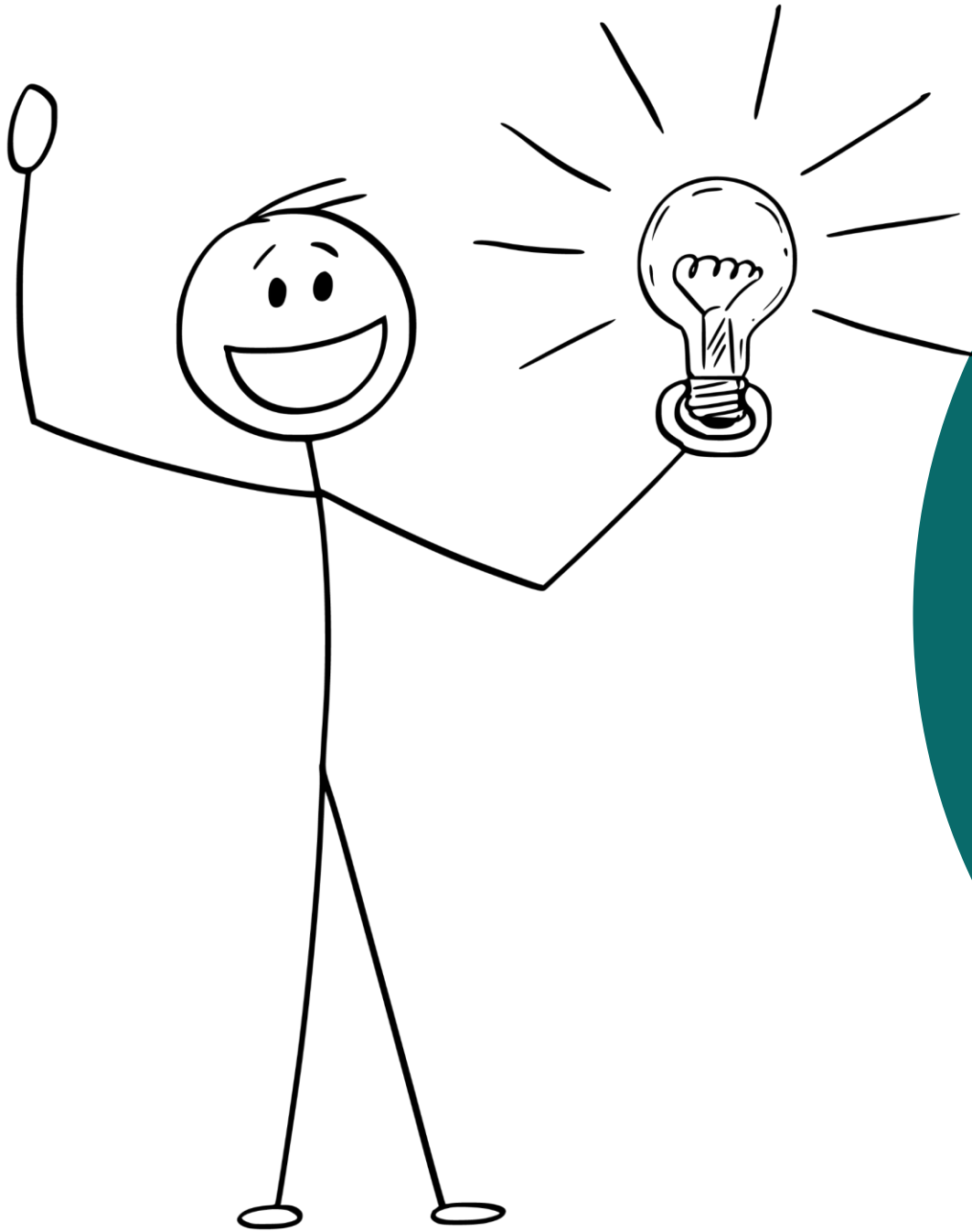
By Alvin Langdon Coburn - Illustrated London News, p. 575, PD-US, https://en.wikipedia.org/w/index.php?curid=49887931


$\frac{x^2}{a^2} - \frac{y^2}{b^2} = \frac{z}{c}$
saddle point of a
hyperbolic paraboloid

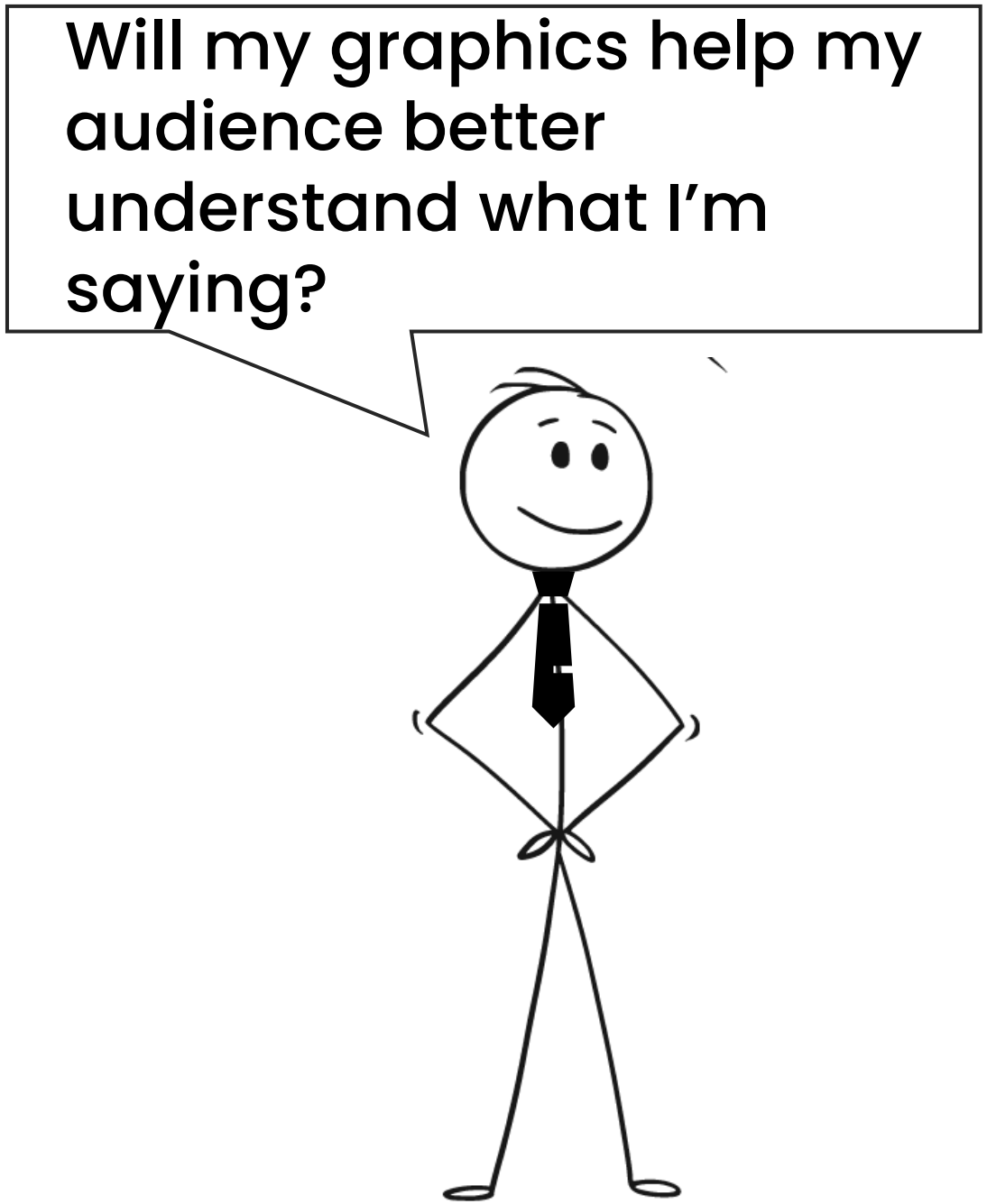



time
culture
experience
mood
education
background
age
Blender


What makes
good graphics?



- Illustrate
- Simplify
- Clarify



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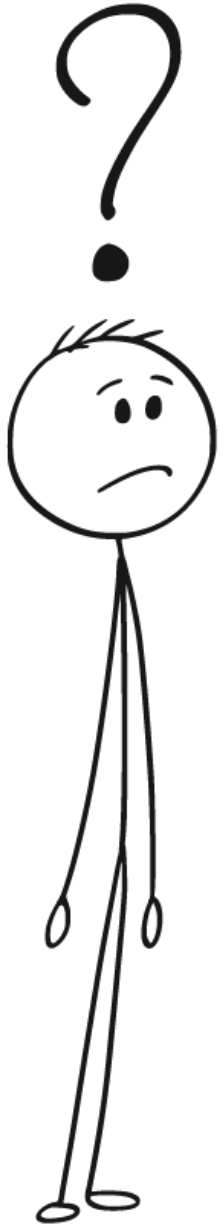
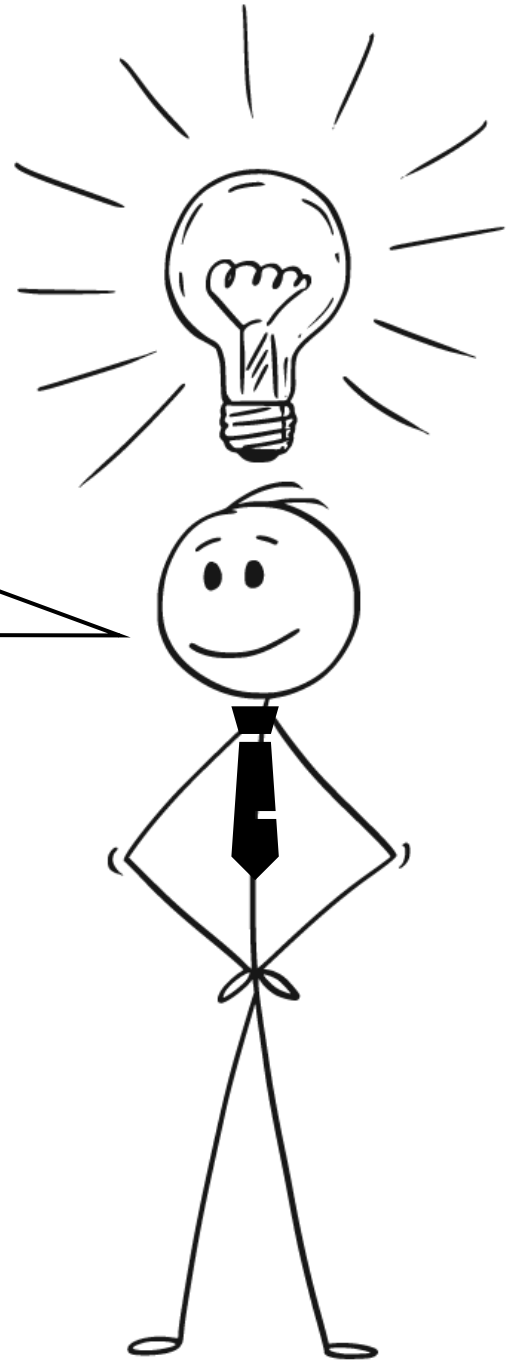
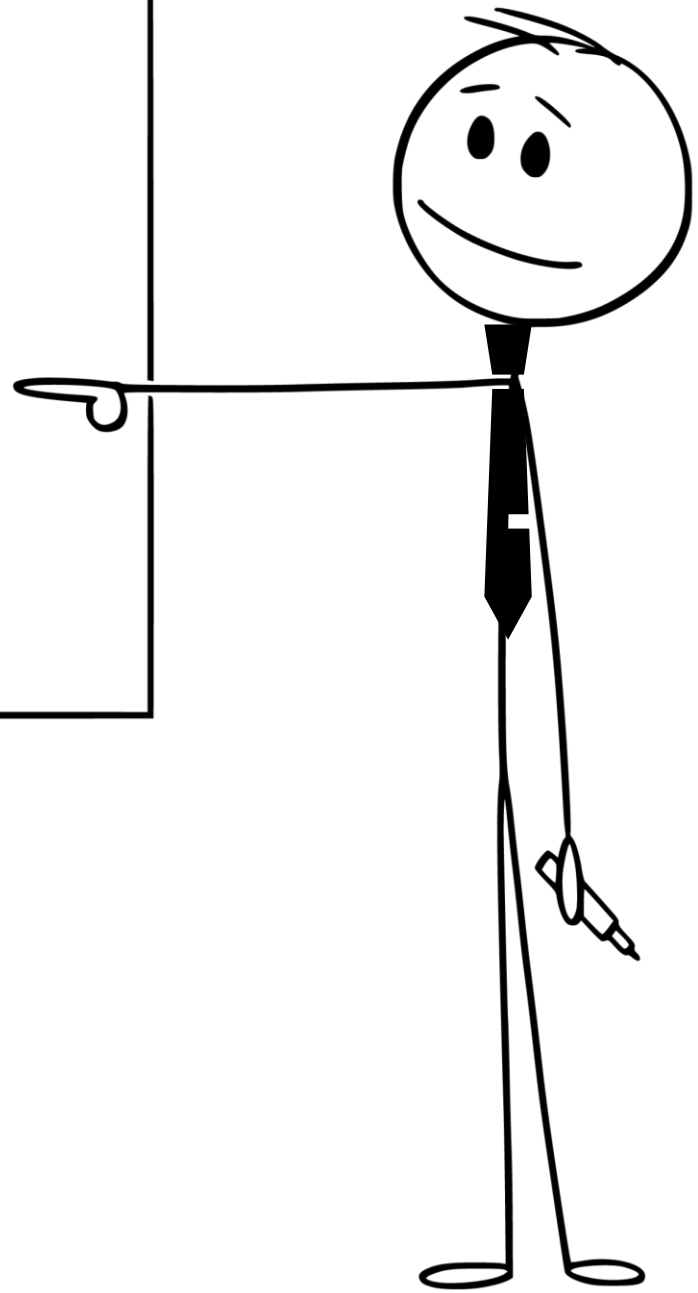
- Simplify
- Clarify

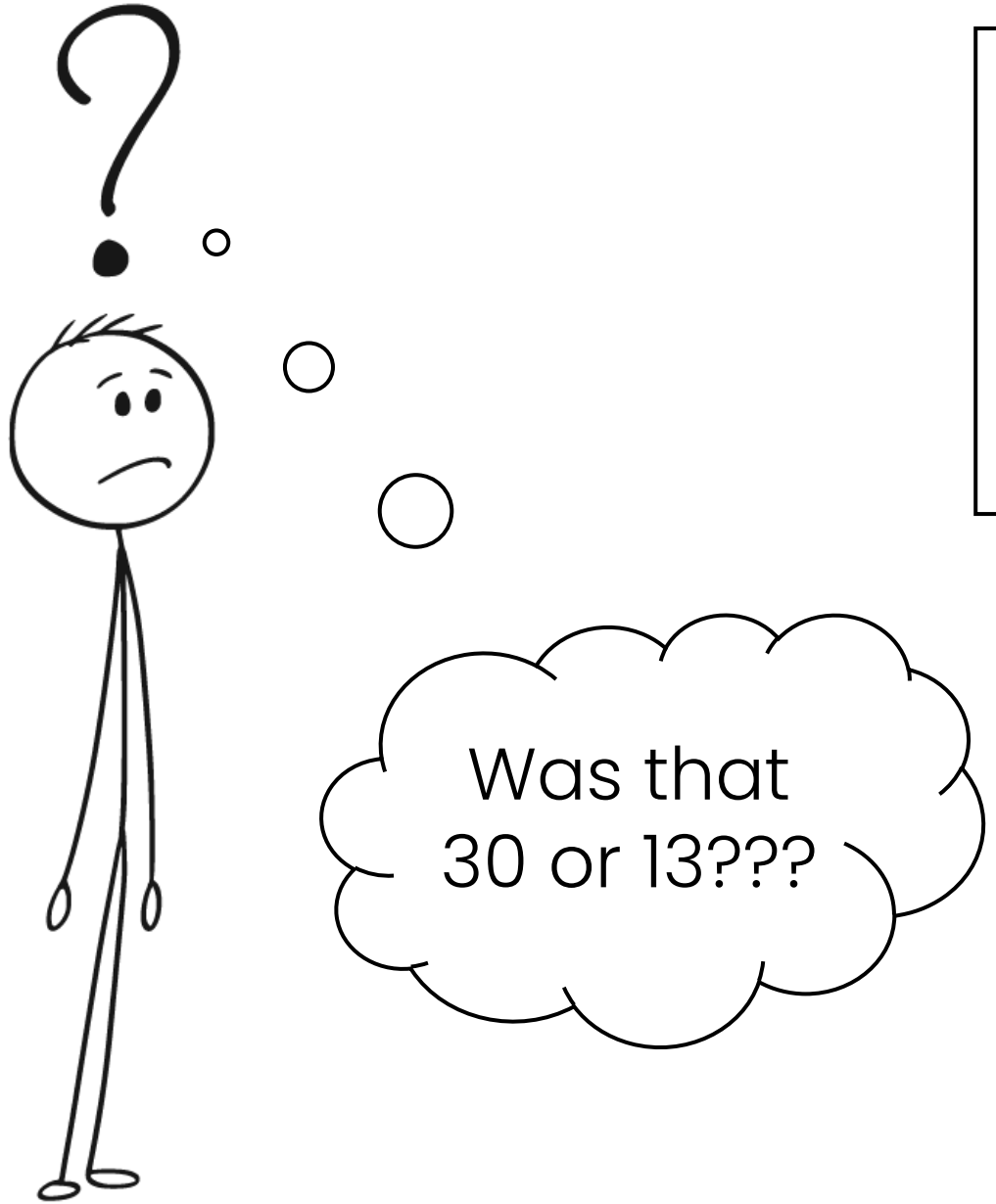


Let’s take for example *Schrödinger*

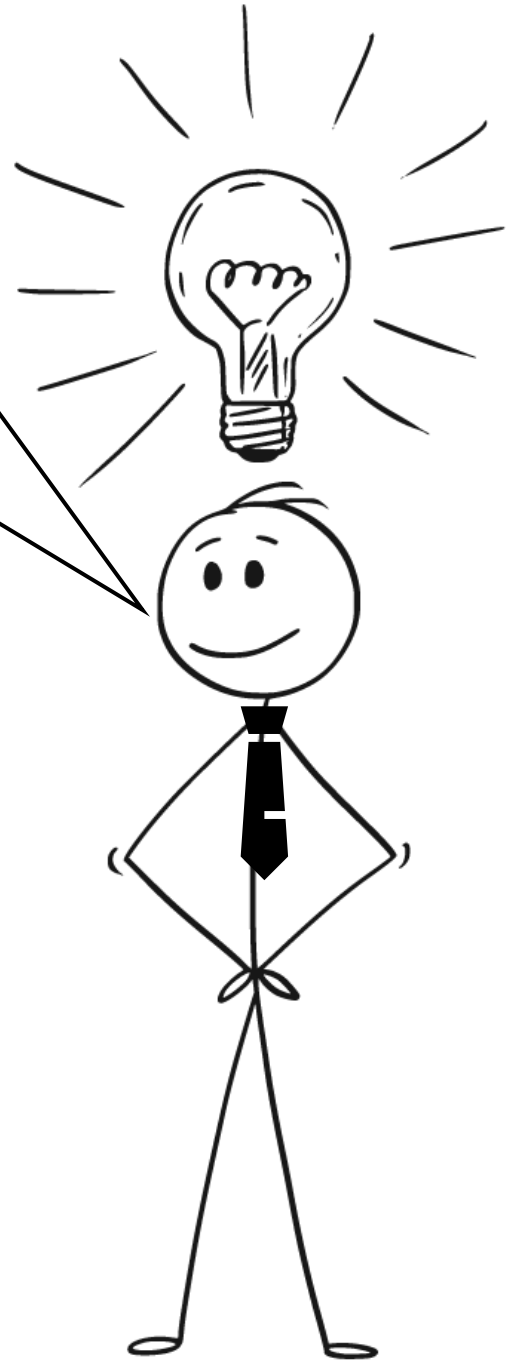


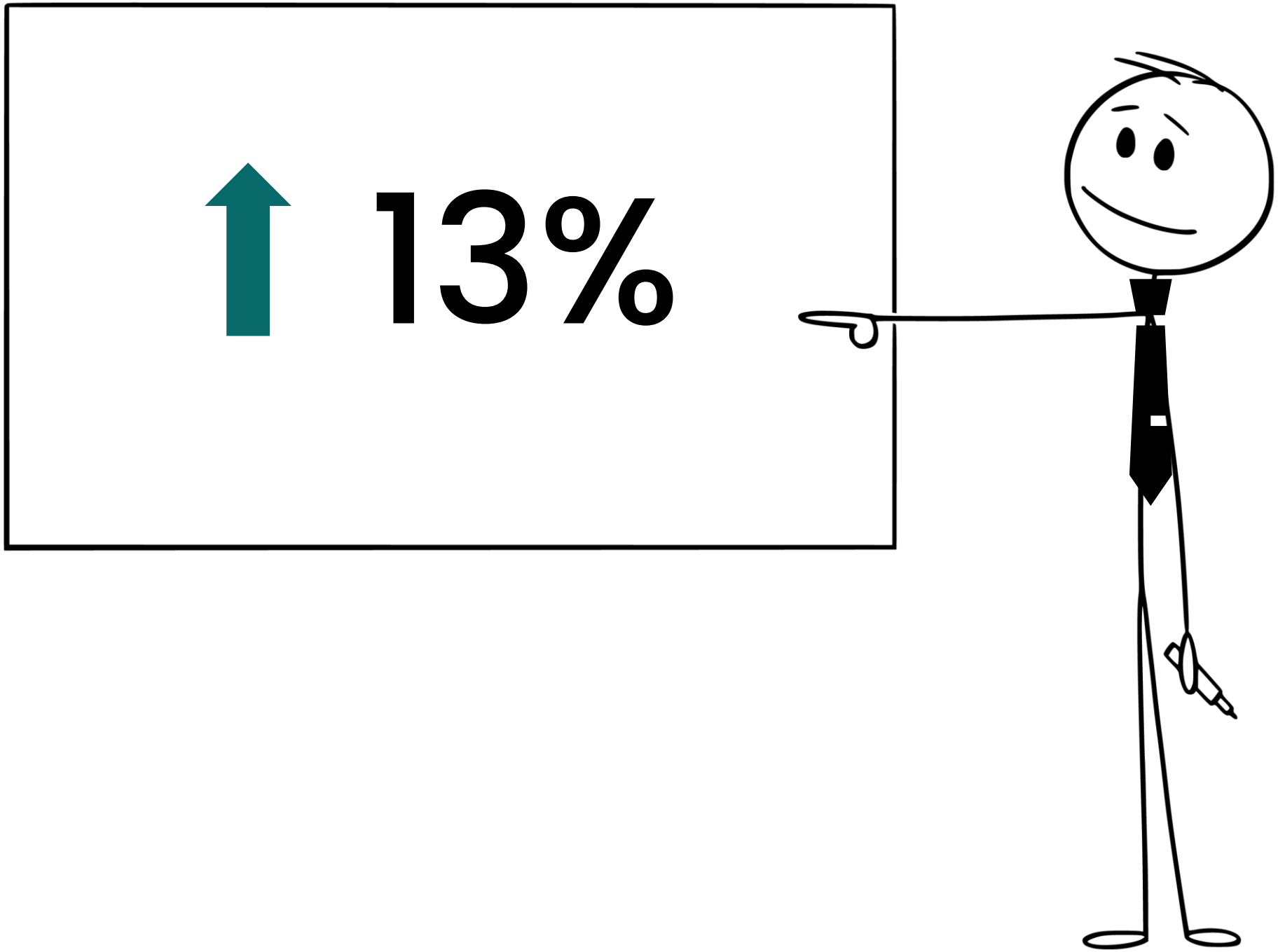
Schrödinger





There was an increase of *13%*

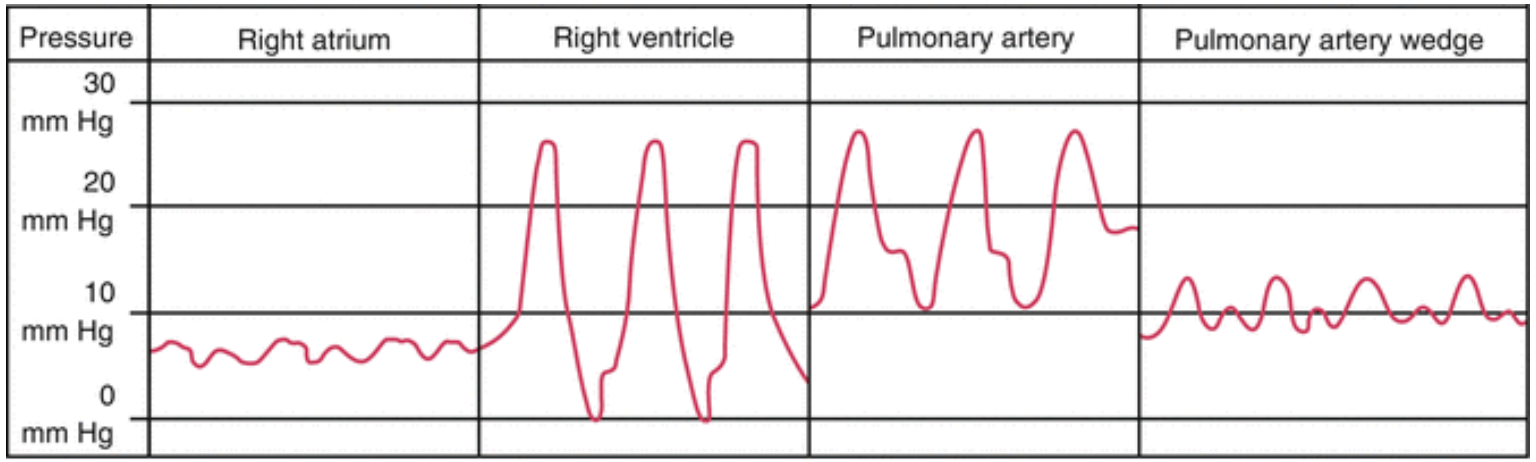



13%

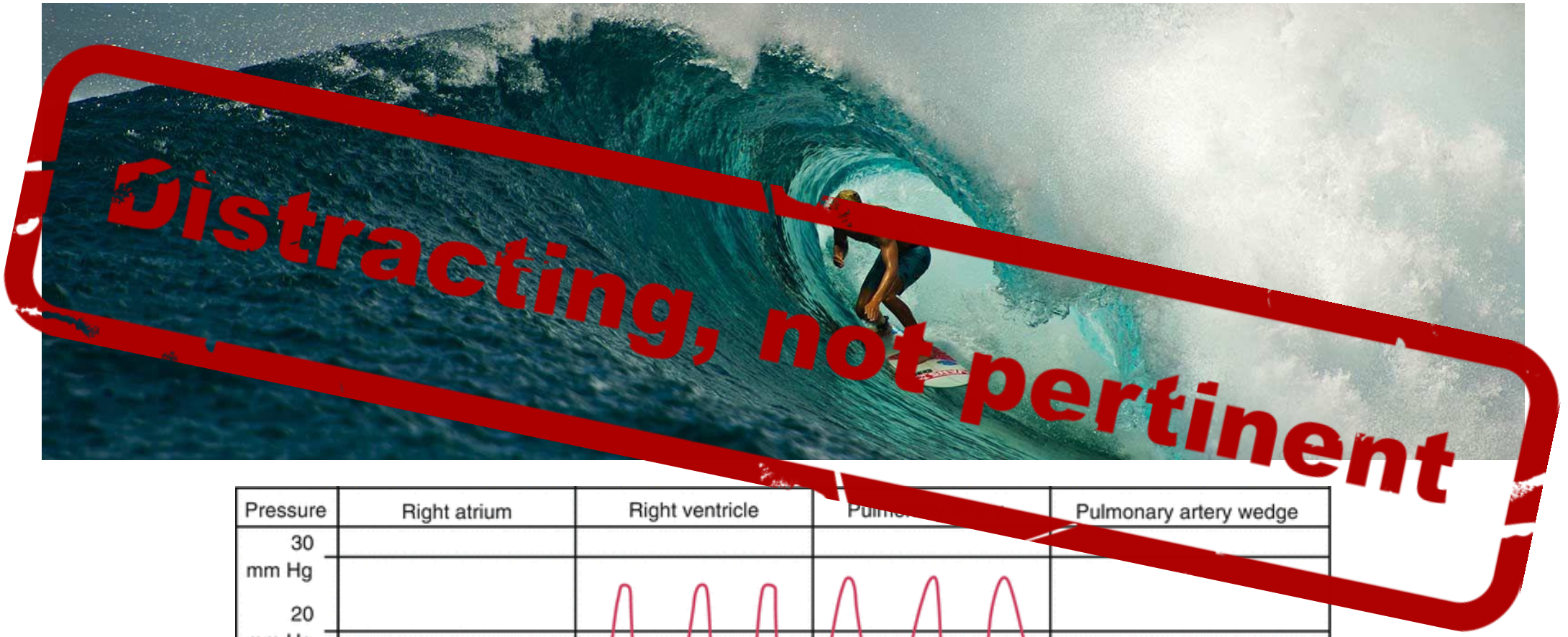
au-dessus 

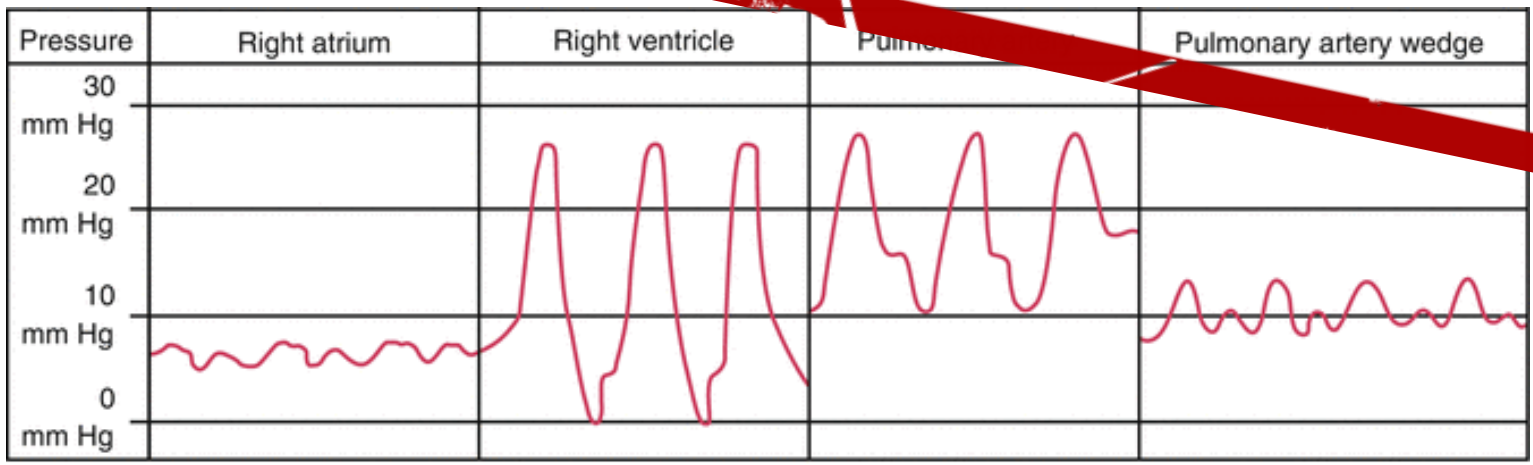
au-dessous 

Swan-Ganz (PAC) insertion is like « Surfing through Blood Stream »



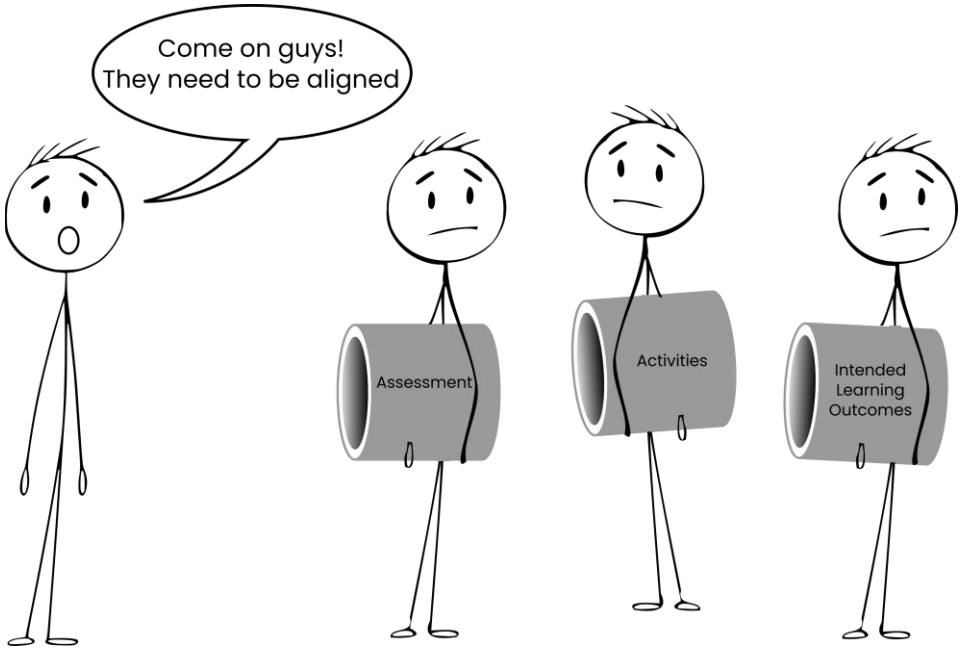
Swan-Ganz (PAC) insertion is like « Surfing through Blood Stream »

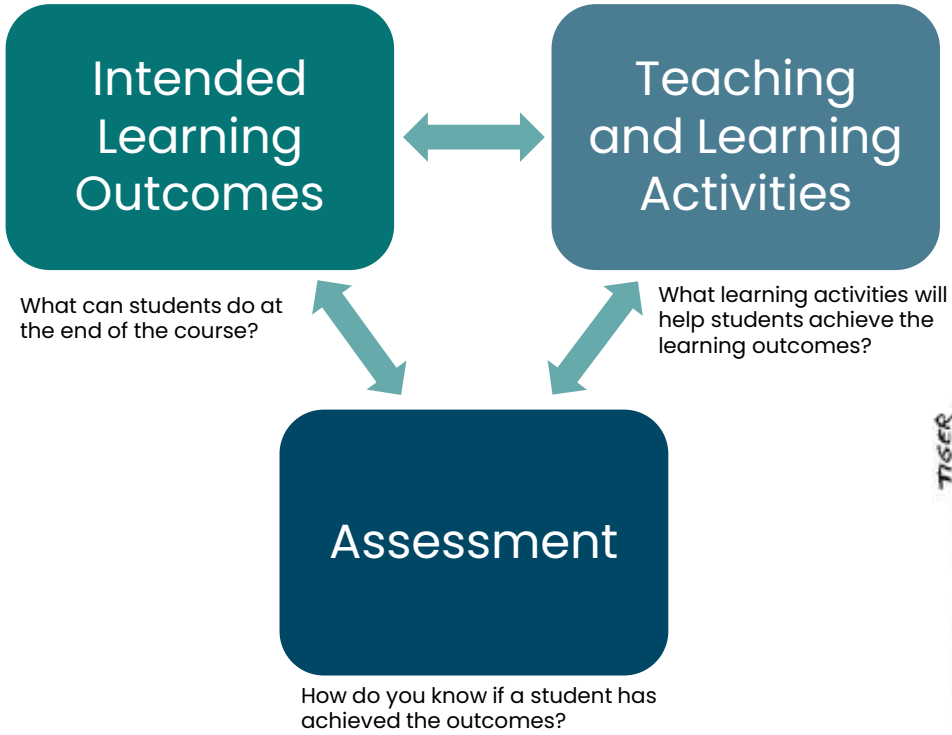




John B. Biggs

Constructive Alignment

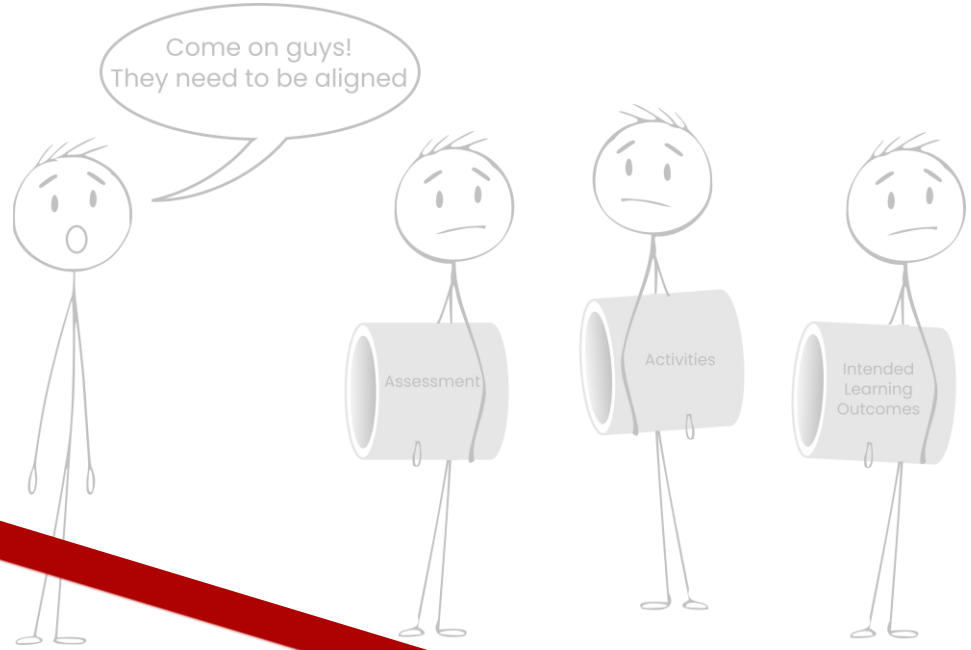




John B. Biggs

Constructive Alignment

Too busy, not readable



Intended Learning Outcomes

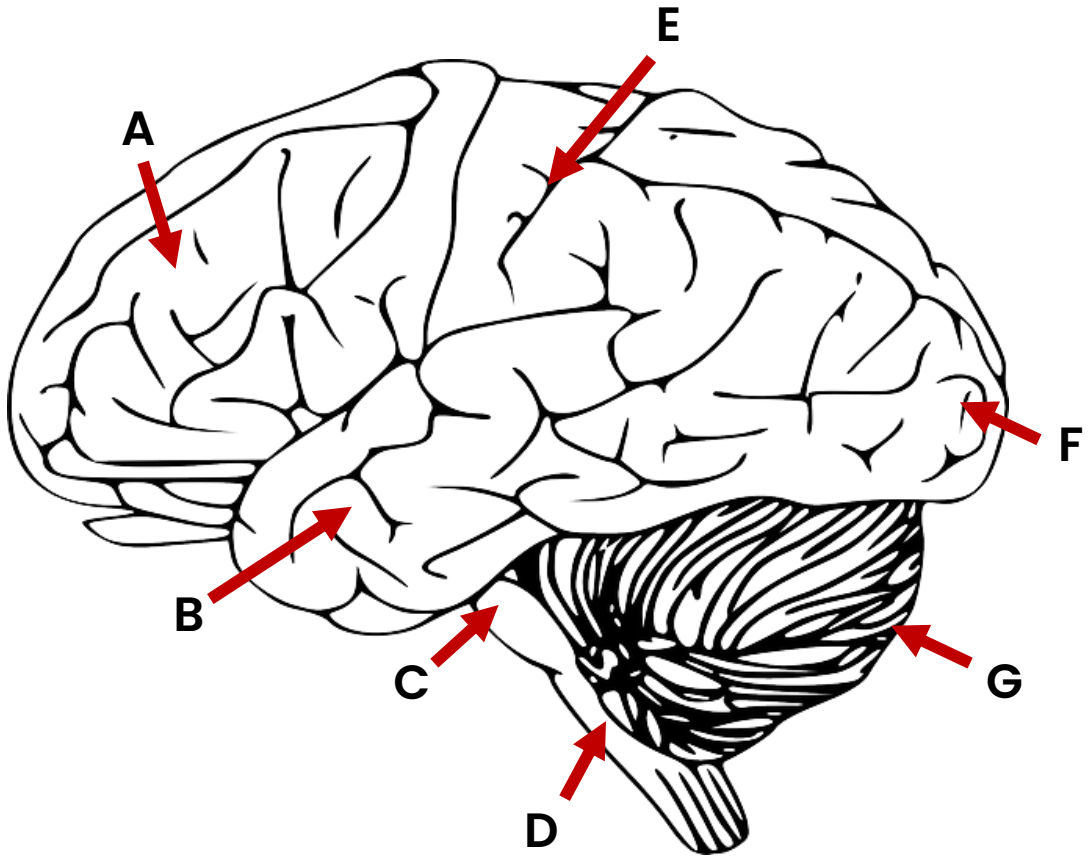
What can students do at the end of the course?

Teaching and Learning Activities

What learning activities help students achieve the learning outcomes?

Assessment

How do you know if a student has achieved the outcomes?



A – Frontal lobe

B – Temporal Lobe

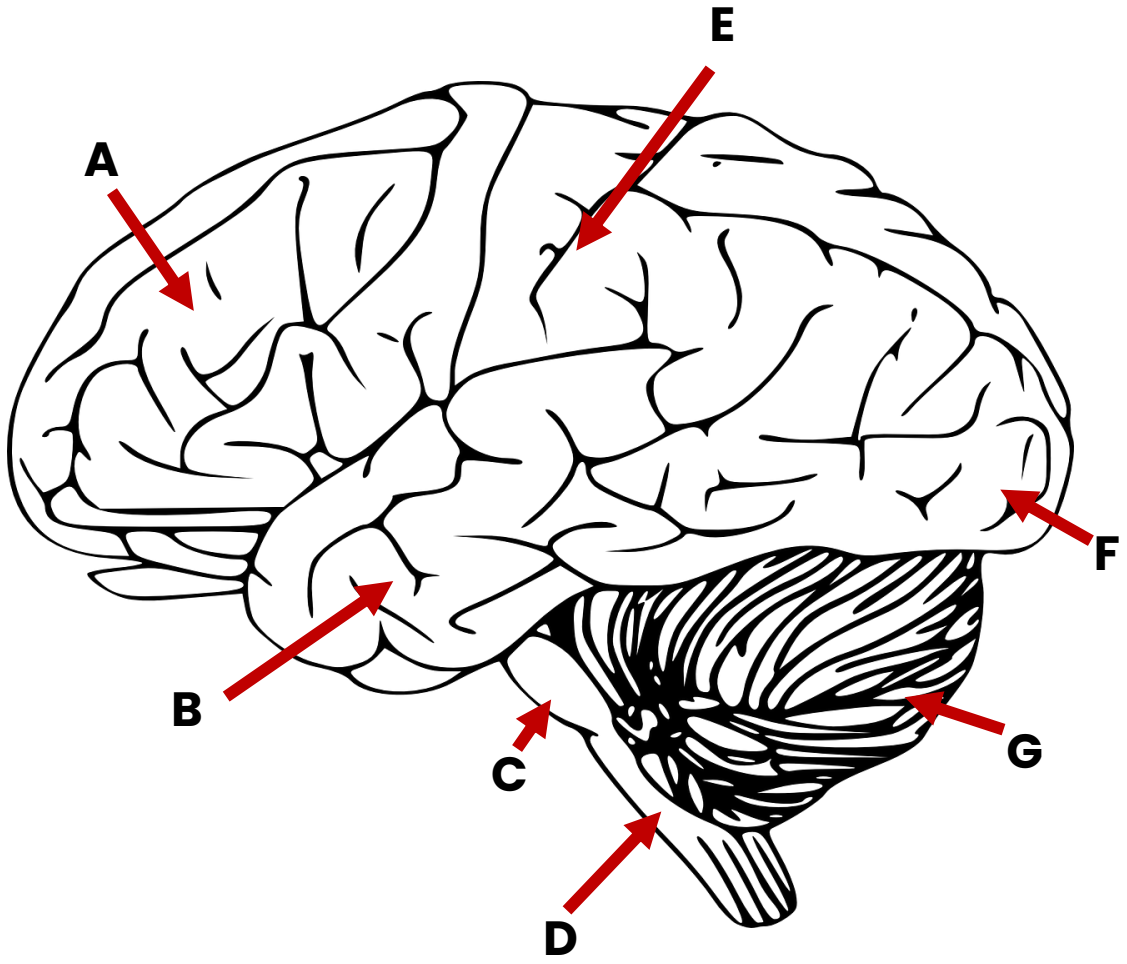
C - Pons

D – Medulla Oblongata

E – Parietal Lobe

F – Occipital Lobe

G - Cerebellum



A – Frontal lobe

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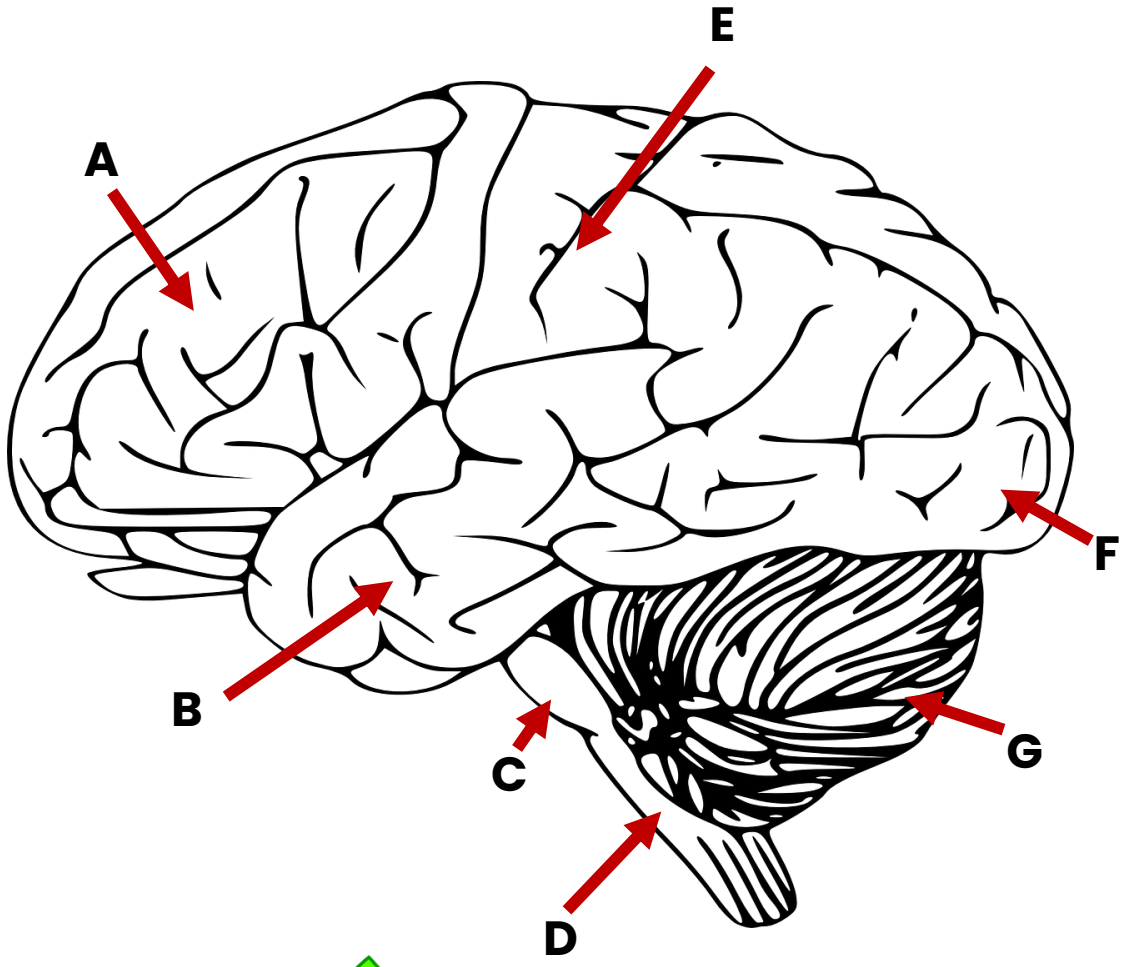
One point ✓

Simple and clear ✓



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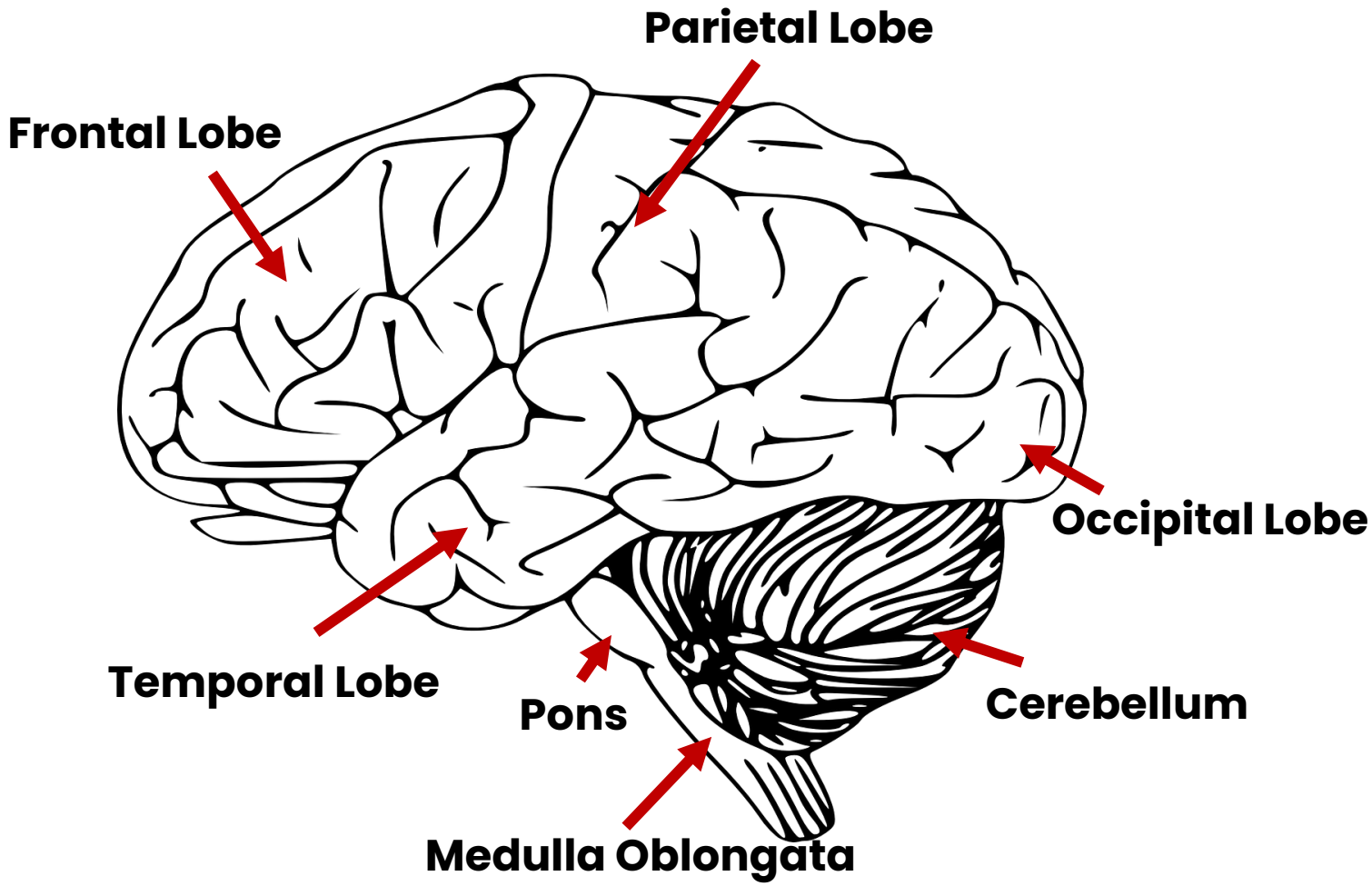
One point ✓

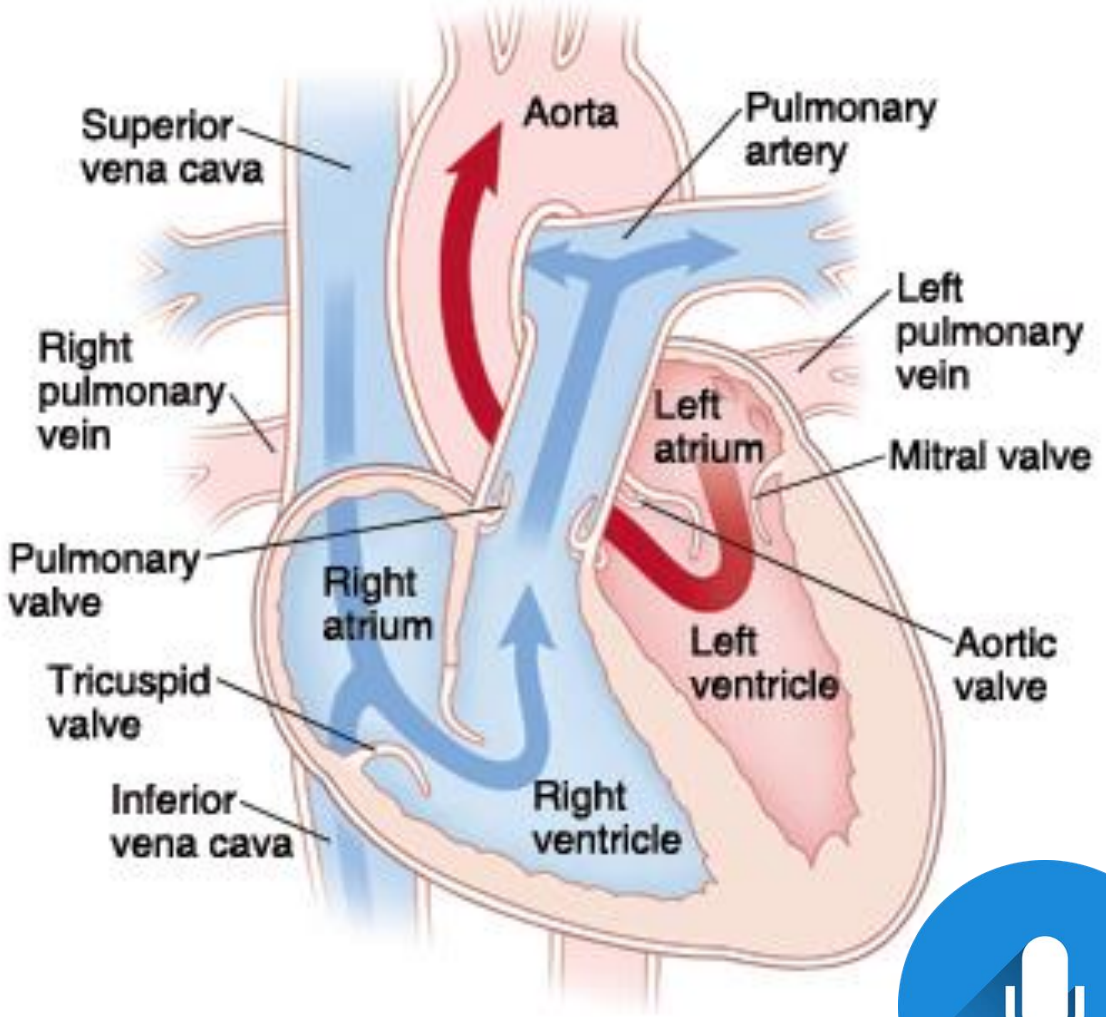
Simple and clear ✓

Wasted processing ✗


Parietal Lobe
Frontal Lobe
Occipital Lobe
Temporal Lobe
Pons
Cerebellum
Medulla Oblongata

How the heart works

As your heart muscle contracts, it pushes blood through your your heart. Your heart pumps blood from its left side, through the aorta (the main artery leaving the heart) and into the arteries. The blood travels through your arteries, which divide into samller and smaller blood vessels called capillaries.



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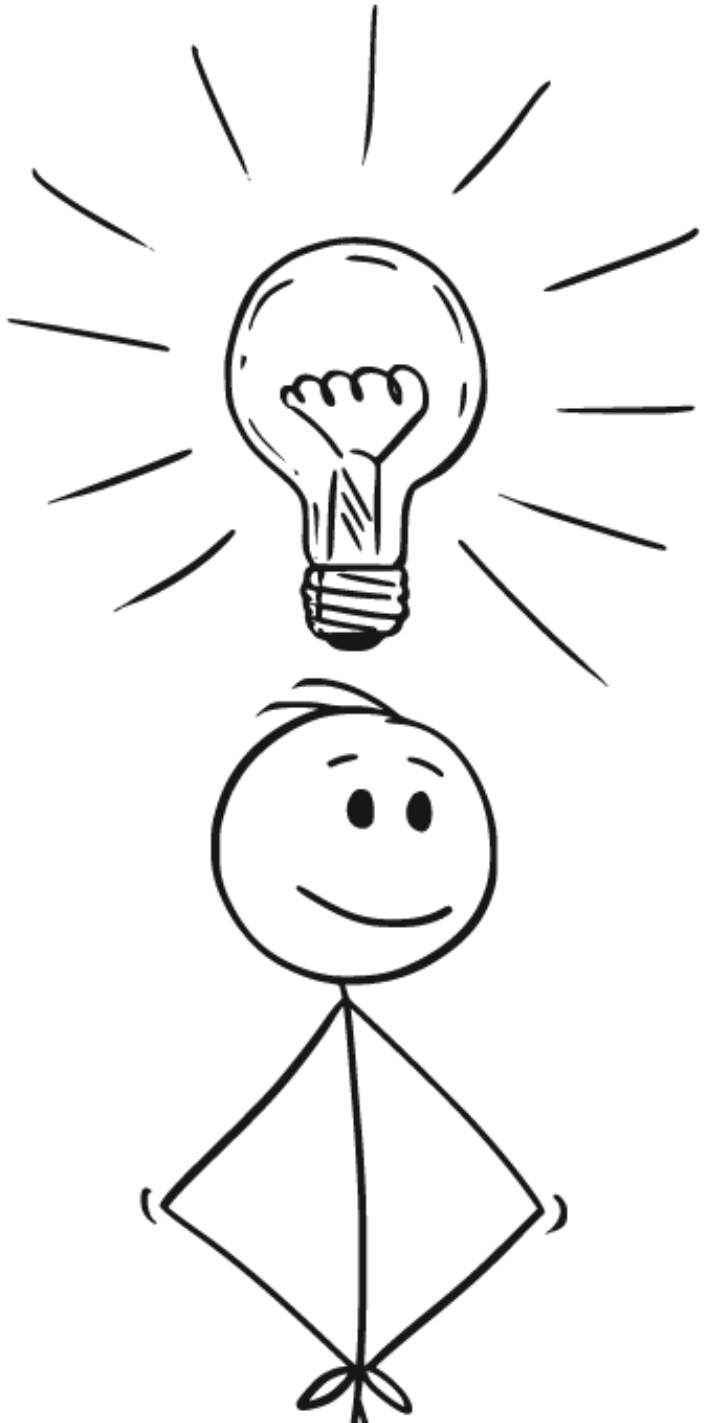
Redundancy does not help

Minimum amount of text

new cencepts

complex content

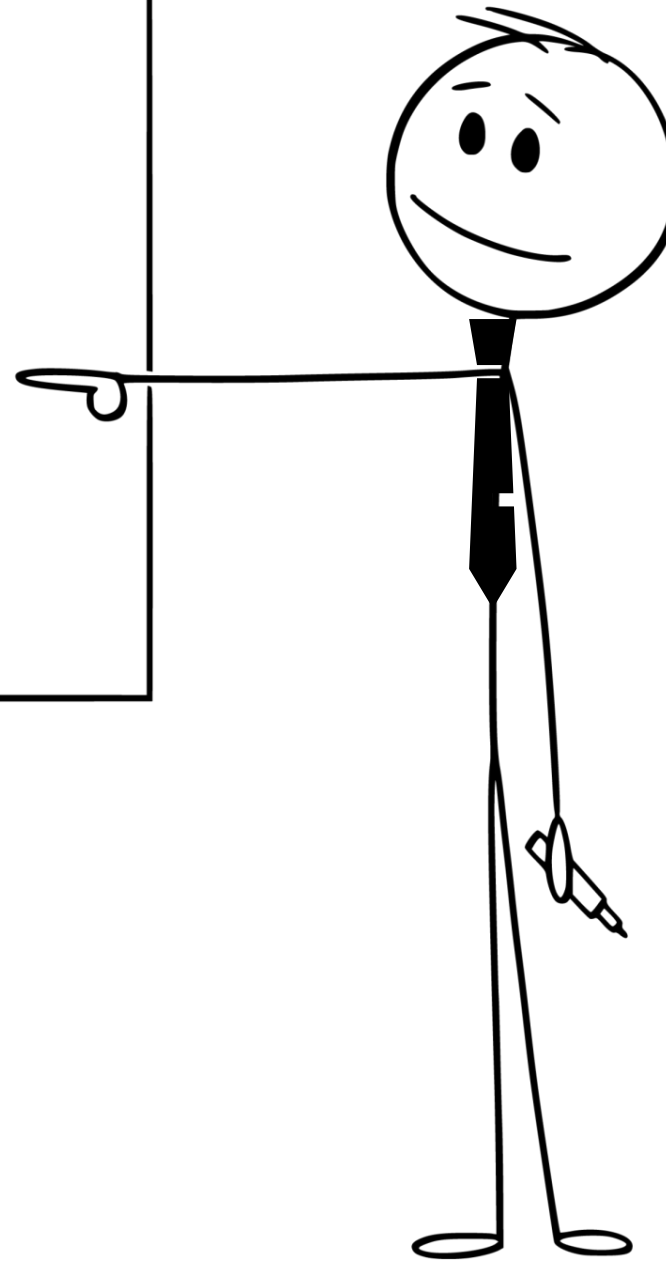
accent I’m not familiar with



Keywords or phrases

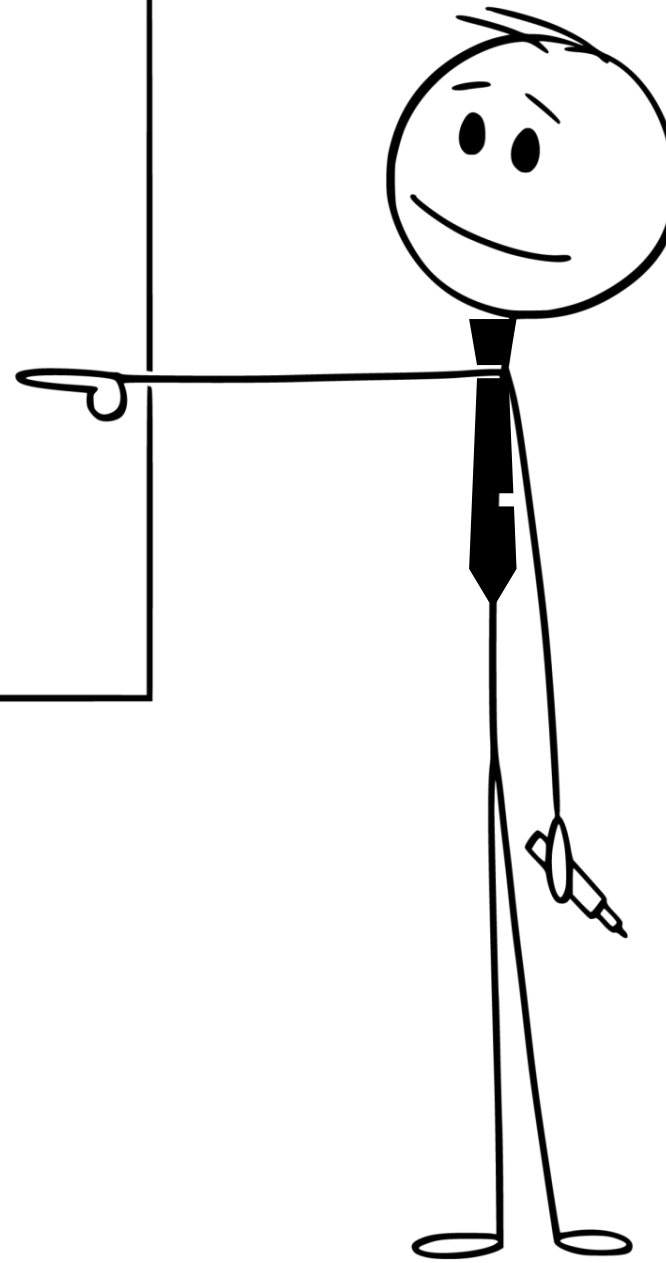
Signaling principle

1 Get information



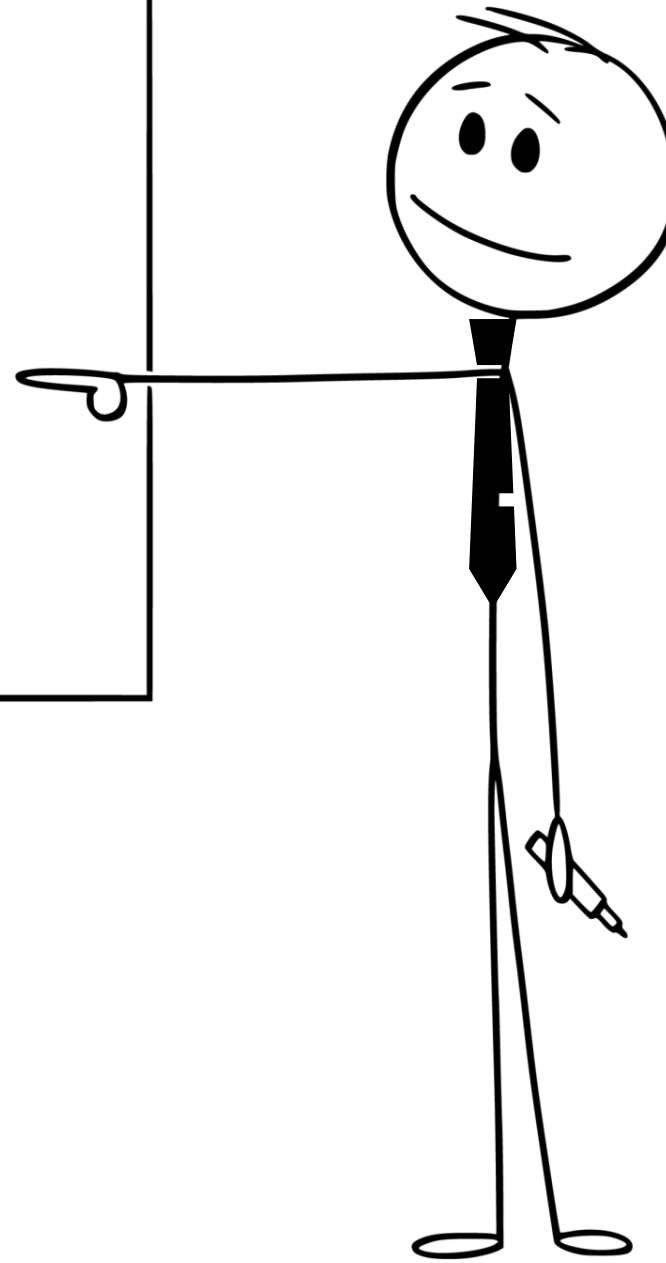
Signaling principle

1. Get information
2. to appear



Signaling principle

1. Get information
2. to appear
3. gradually



Signaling principle

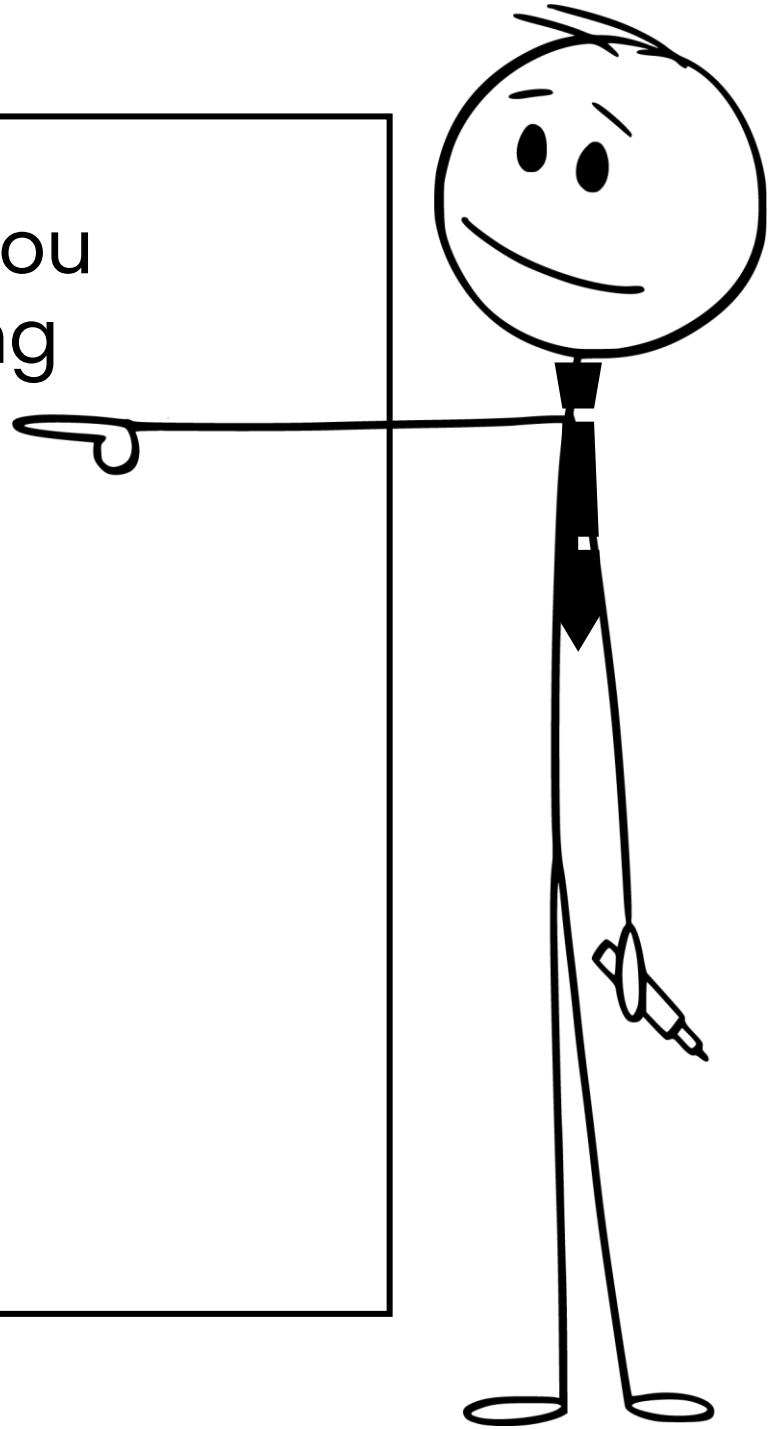
1

Fade the parts you aren’t mentioning

2

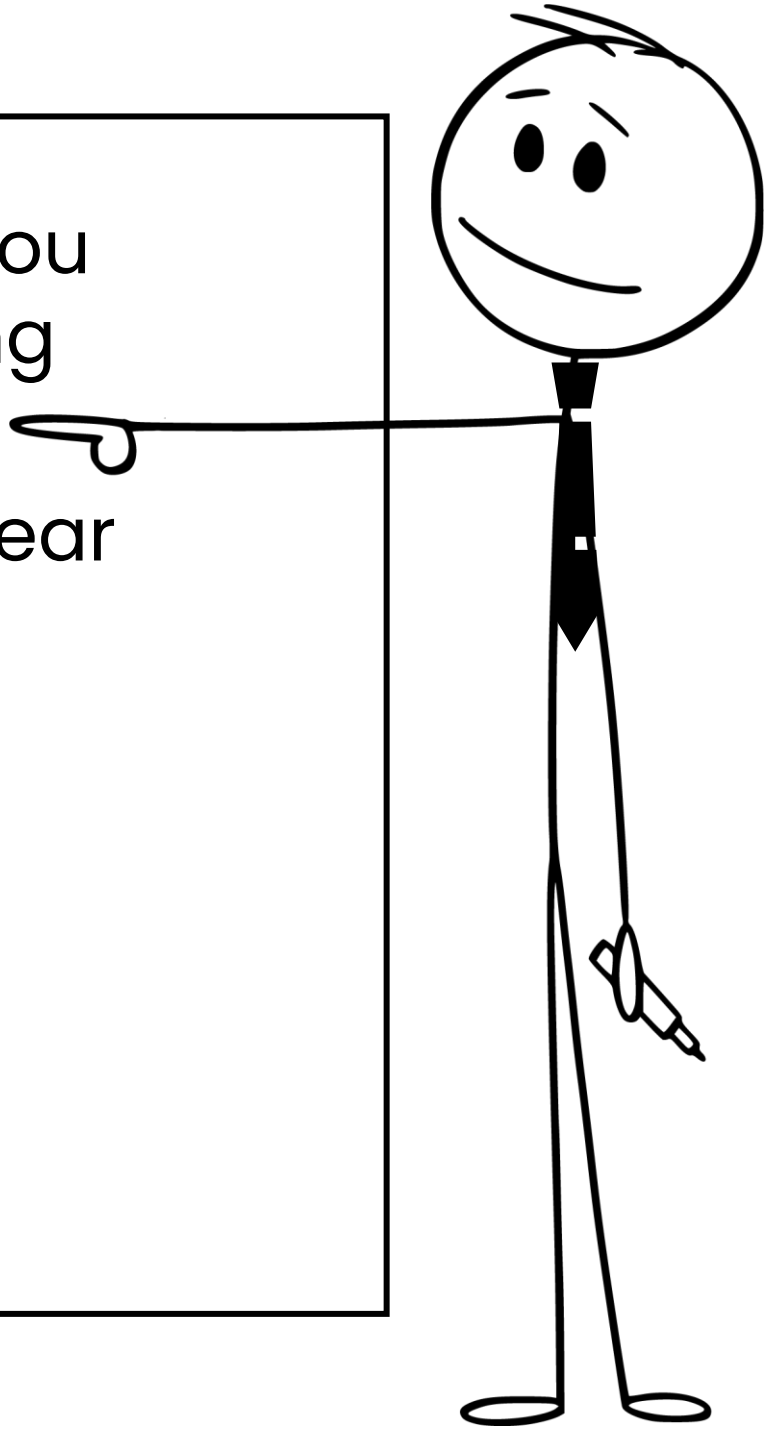
3

4



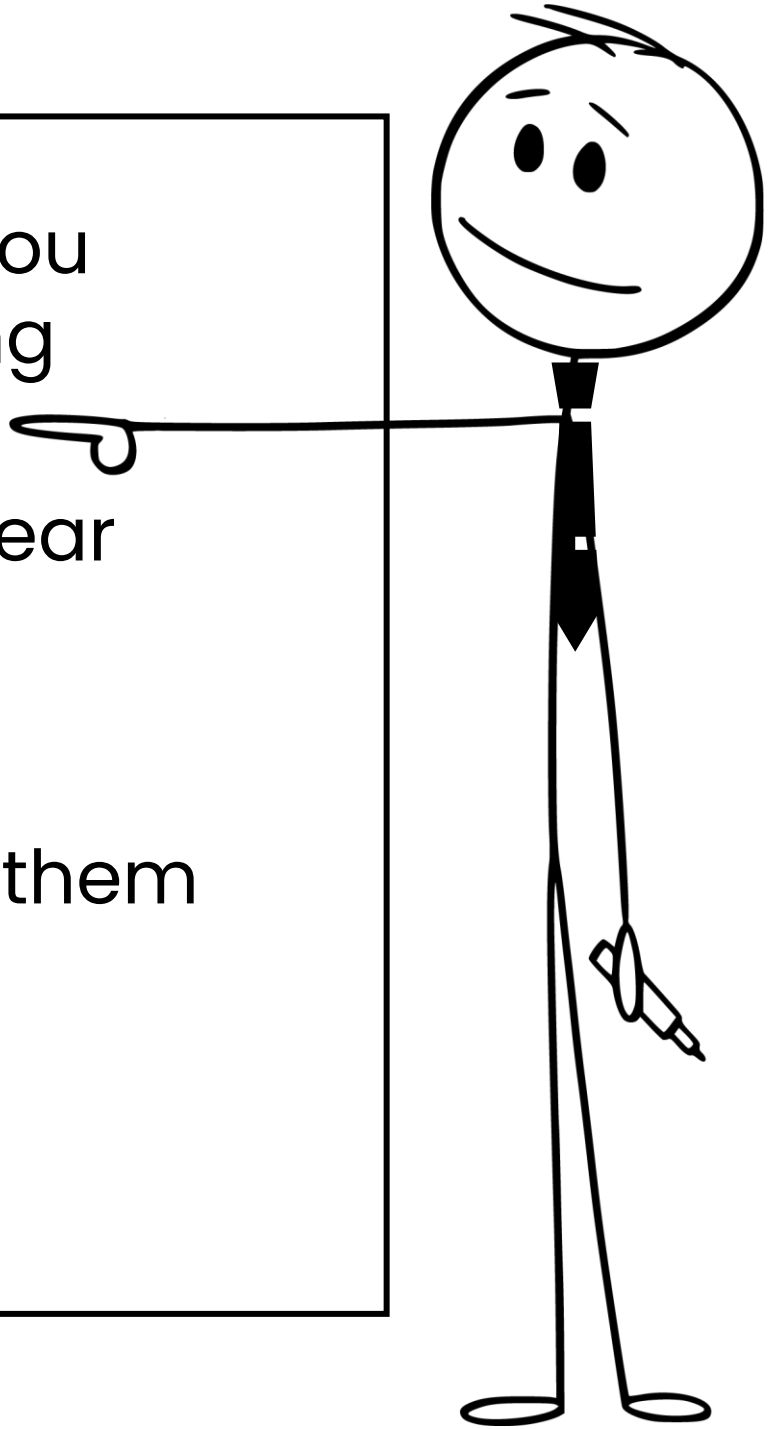
Signaling principle

1. Fade the parts you aren’t mentioning
2. Make them appear gradually
3.
4.



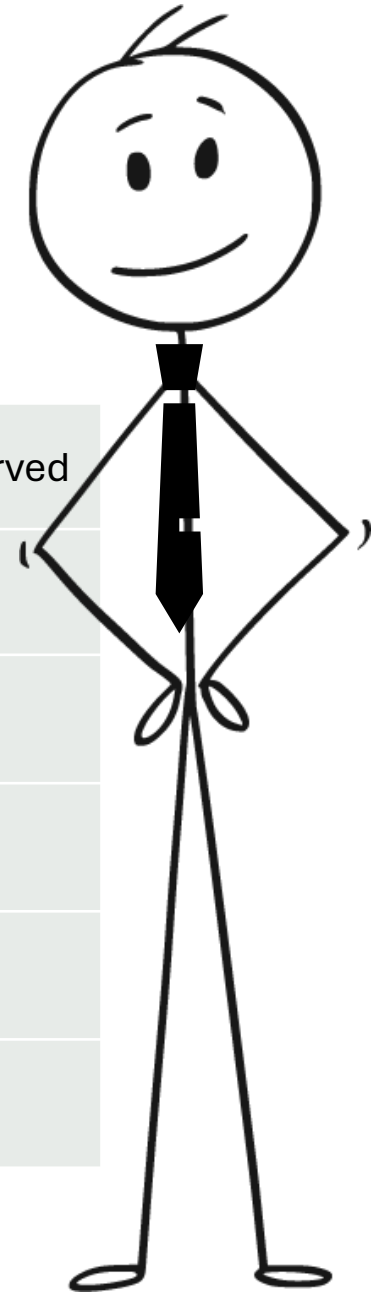
Signaling principle

1. Fade the parts you aren’t mentioning
2. Make them appear gradually
3. As you mention them
4.

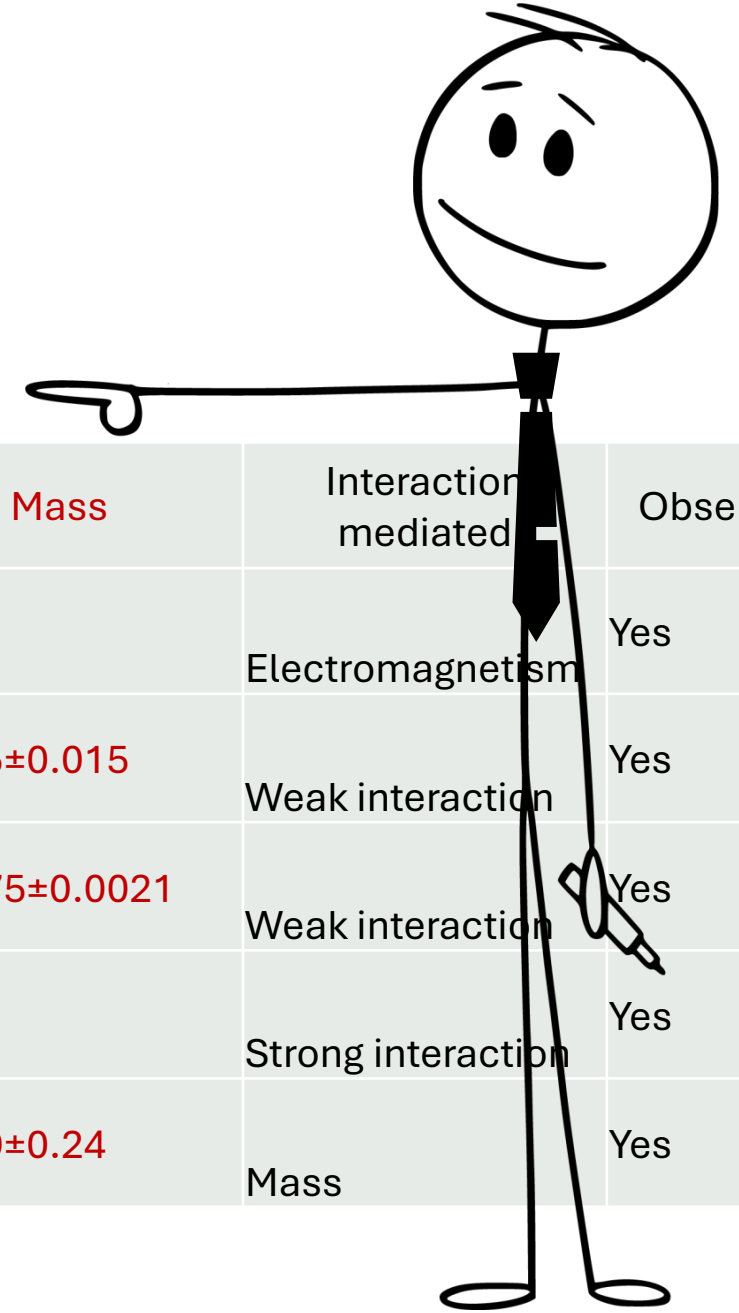


Signaling principle

Name	Symbol	Antiparticle	Spin	Charge	Mass	Interaction mediated	Observed
Photon	γ	Self	1	0	0	Electromagnetism	Yes
W boson	W^-	W^+	1	−1	80.385±0.015	Weak interaction	Yes
Z boson	Z	Self	1	0	91.1875±0.0021	Weak interaction	Yes
Gluon	g	Self	1	0	0	Strong interaction	Yes
Higgs boson	H^0	Self	0	0	125.09±0.24	Mass	Yes



Signaling principle



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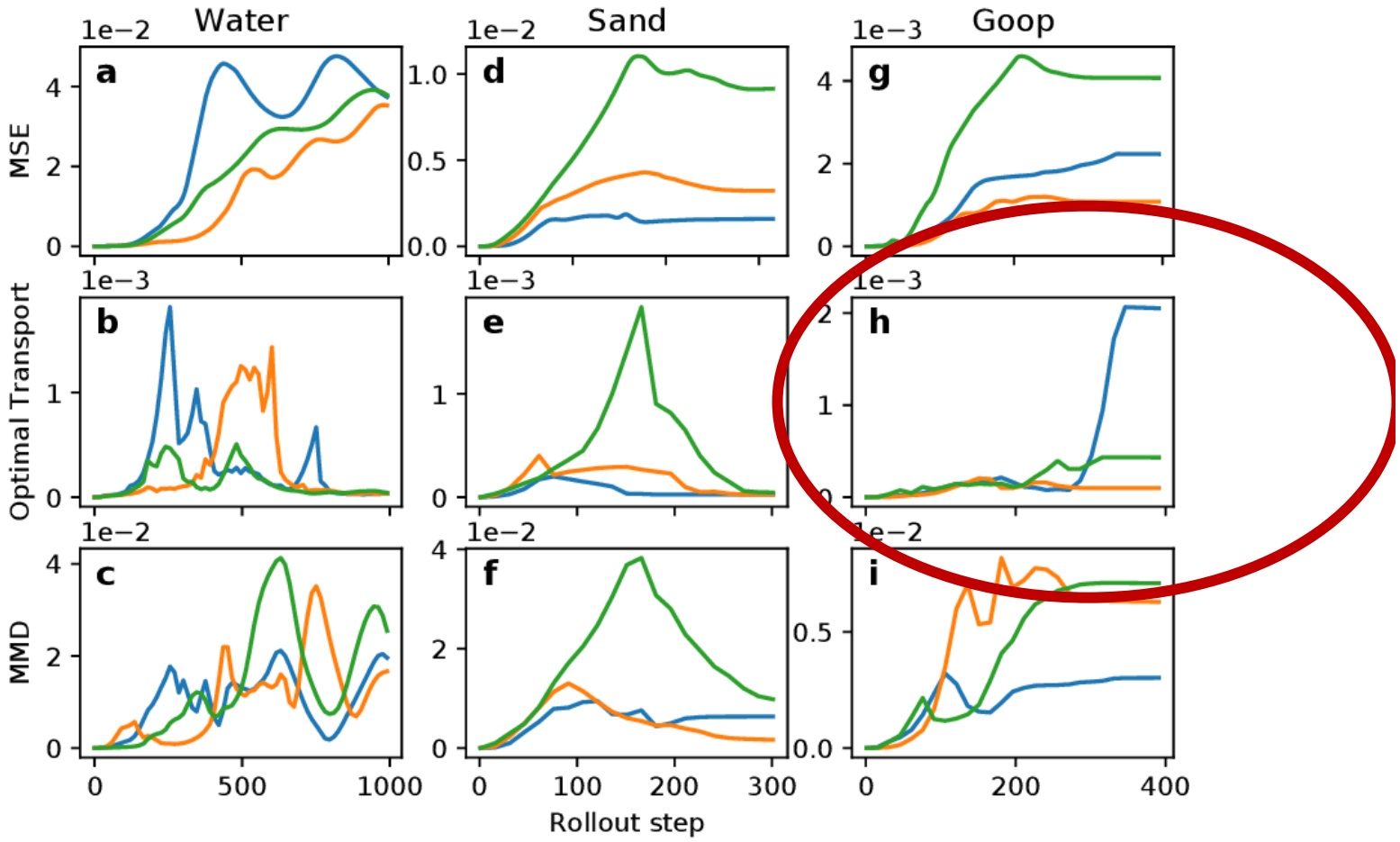
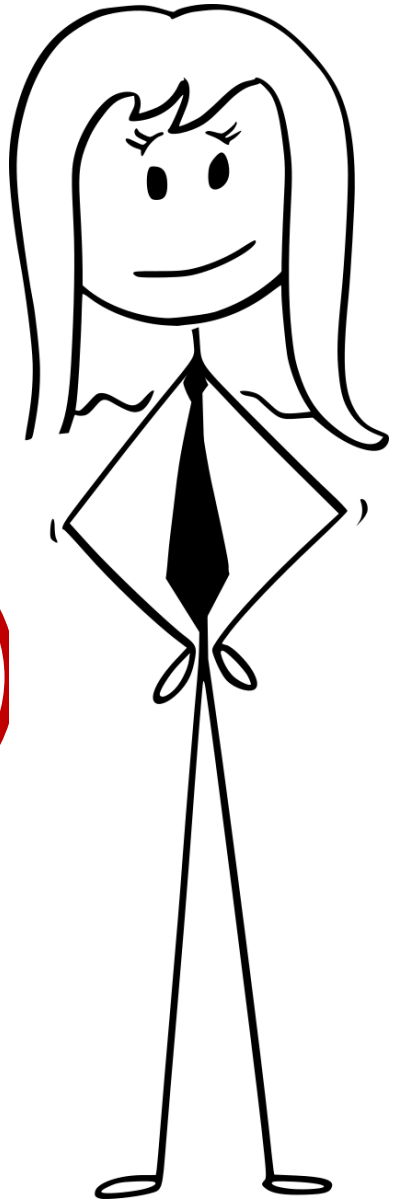
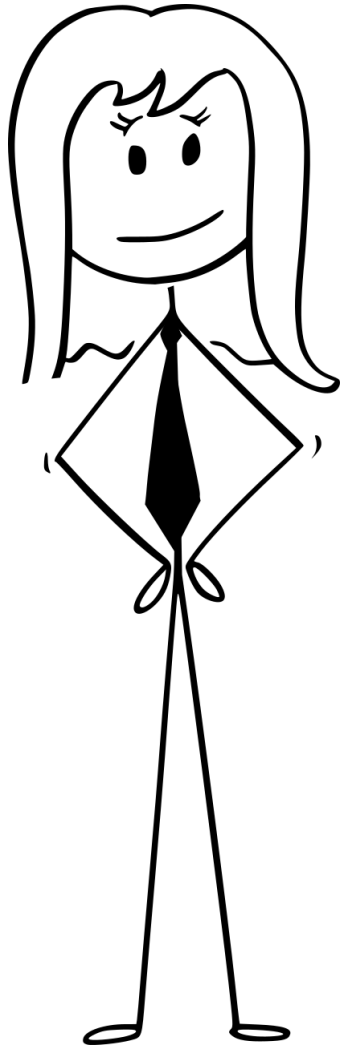
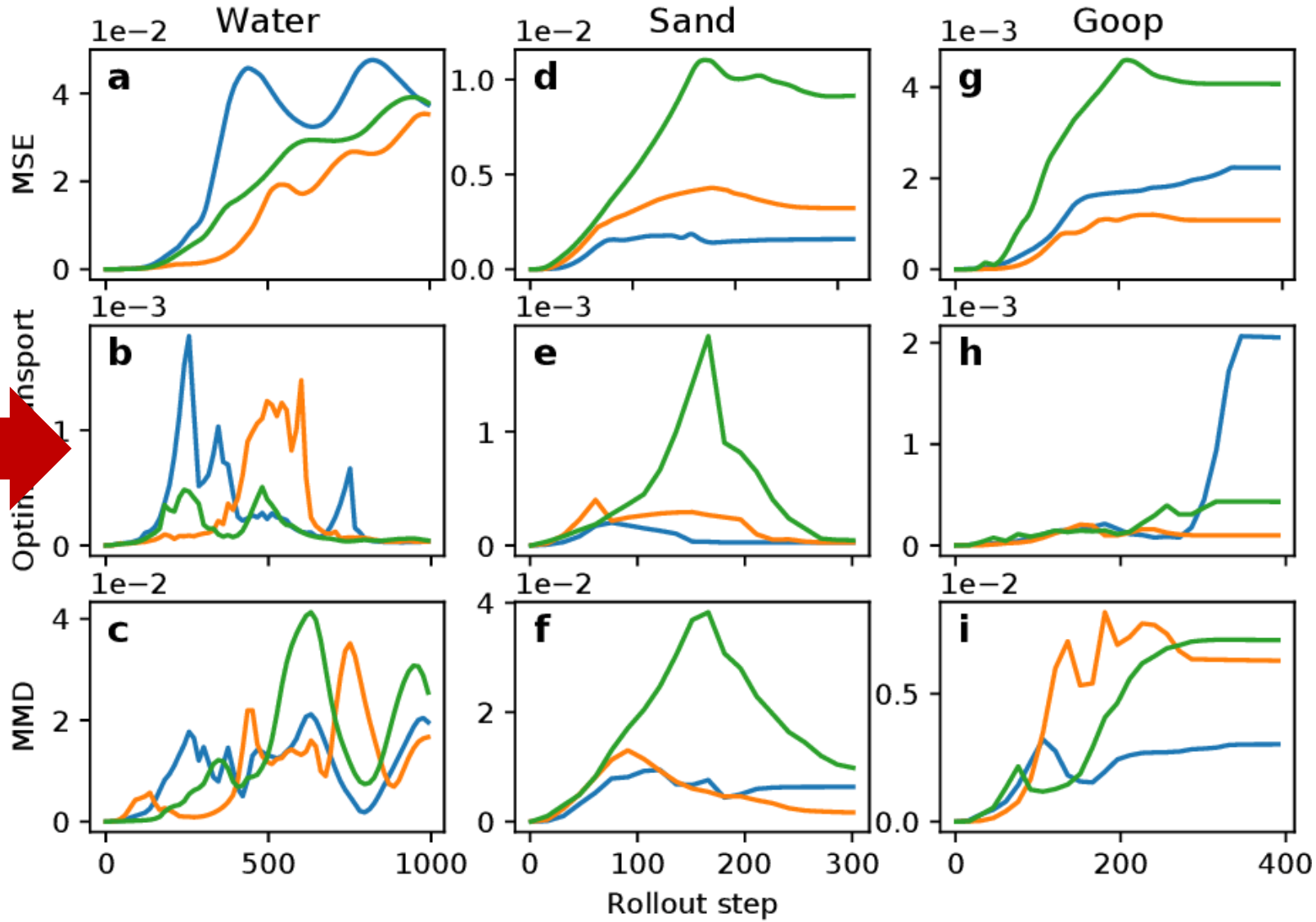


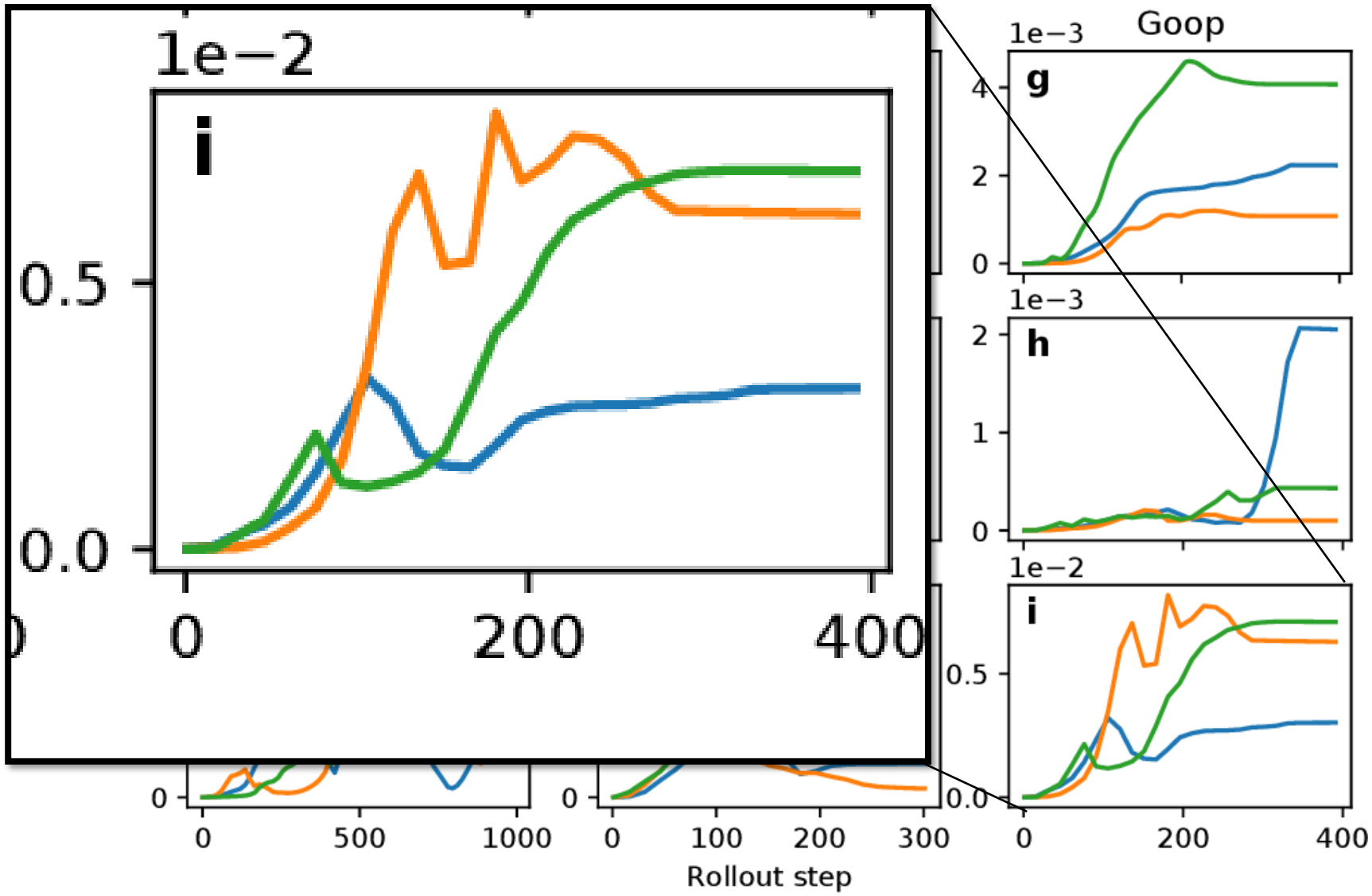


Signaling principle

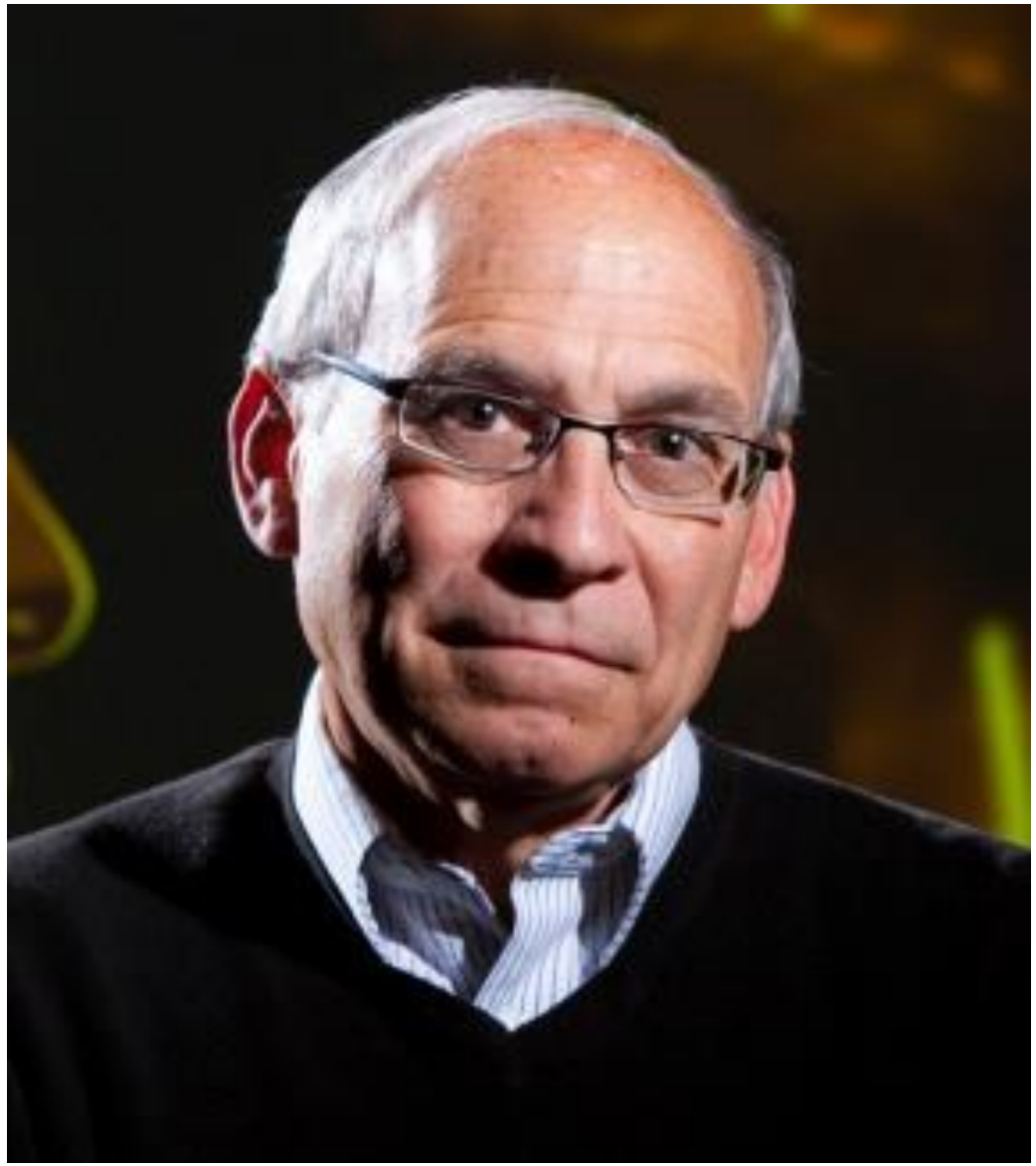




Signaling principle



Richard E. Mayer



Principles of Multimedia Design

1. Coherence Principle
2. Signaling Principle
3. Redundancy Principle
4. Spatial Contiguity Principle
5. Temporal Contiguity Principle
6. Segmenting Principle
7. Pre-training Principle
8. Modality Principle
9. Multimedia Principle
11. Personalization Principle
10. Voice Principle
12. Image Principle

Ten minutes to present:

- a chunk of your course
- an example of storytelling or analogy
- some visuals you have designed
- an activity

NEXT WEEK