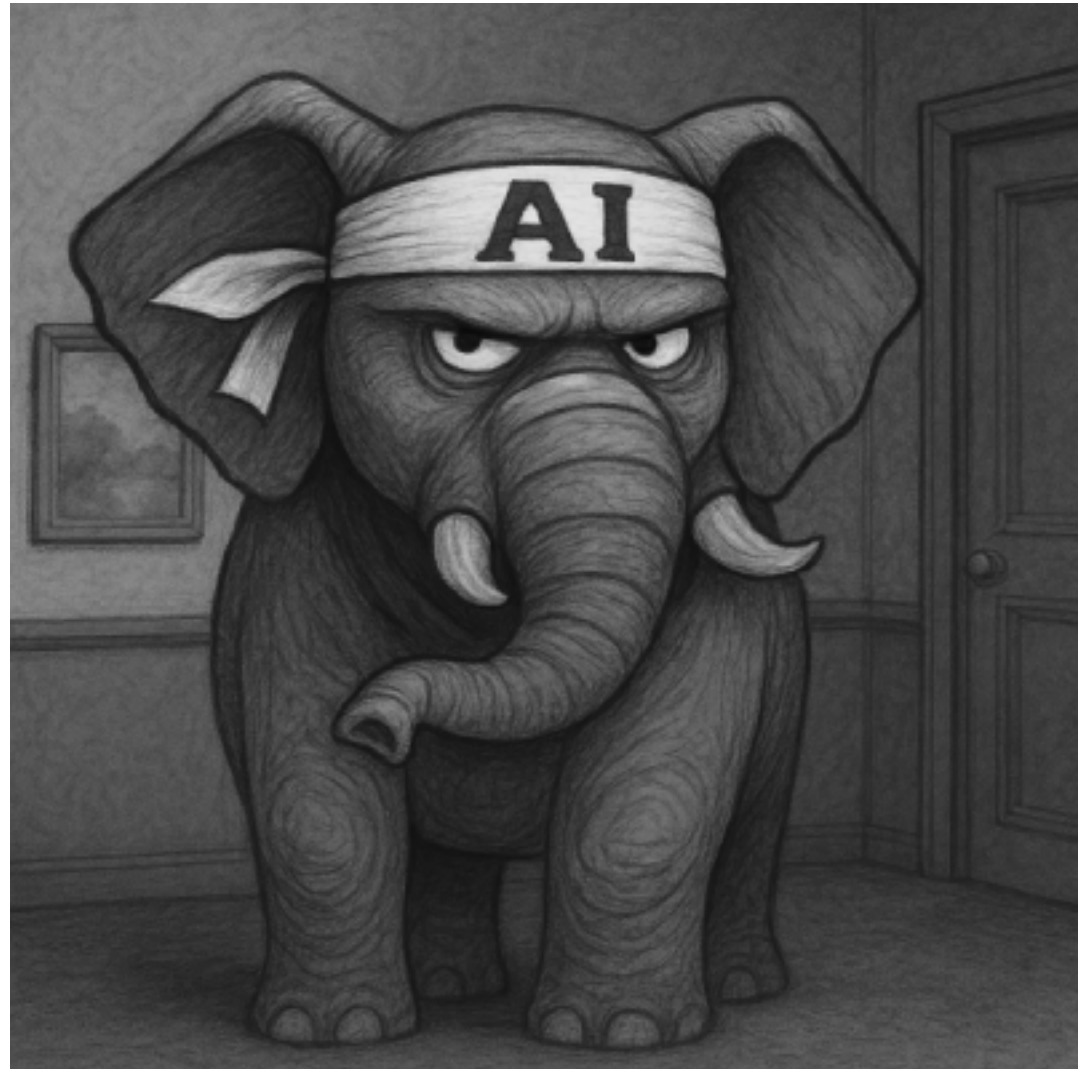
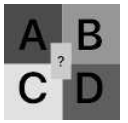


AI & Learning



Why are we here?!



- Why are you pursuing your degree?
 - a) Get a good job.
 - b) Love learning.
 - c) Make the world a better place.
 - d) Better than the alternative (someone made me).
- What is the most important thing to get out of your university studies?
 - a) Knowing how to learn.
 - b) Knowing how to breakdown a complex problem.
 - c) Knowing how to use tools, like AI.
 - d) Knowing how to follow directions.
- What part of your courses teach this?
What does using AI on an assignment teach?



Pexels: Craig Adderley 2

How can we learn Kung Fu (or Karate)?



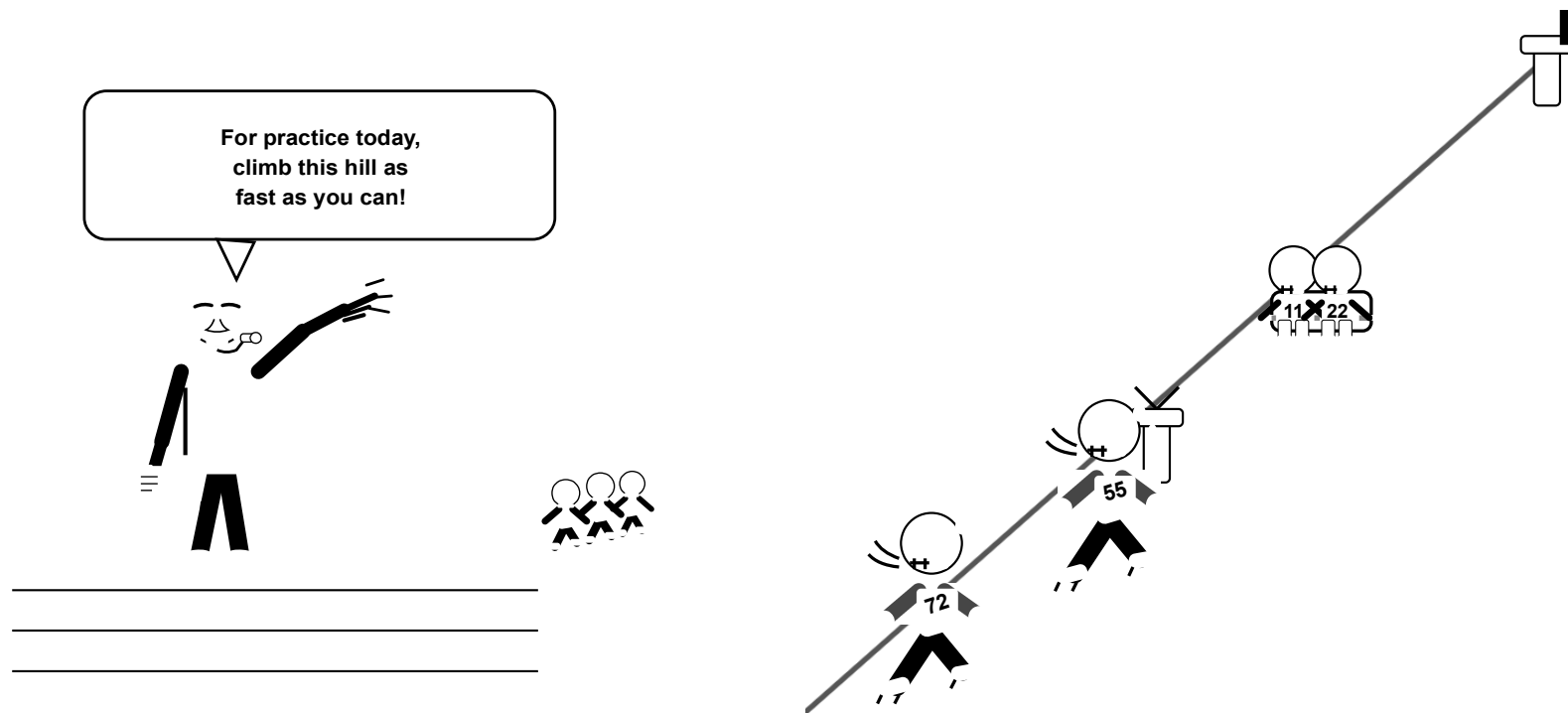
The Matrix (1999)



Karate Kid (2010)

How AI Effects Learning

- AI can quickly produce “good” output with minimal prompting.
 - GenAI automates the generation of content.
 - GenAI does not automate learning.



Productive Struggle

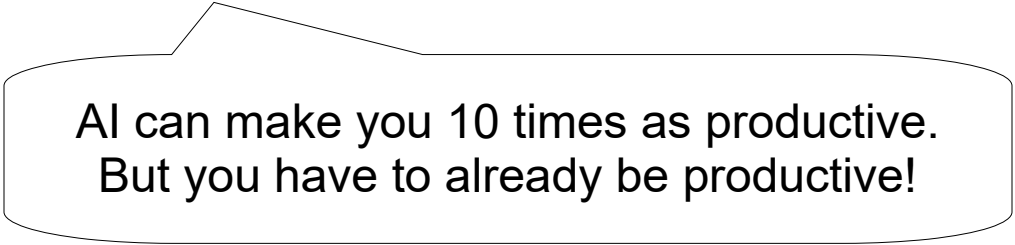
- Humans need a **productive struggle** to learn
 - Neuroplasticity allows your brain to rewire (learn) through activation.
 - Struggling through a task helps your brain understand the task and rewire to do it better.
- E.g.: MIT Experiment -- Fortran and LLMs (~2024)
 - Divide class into groups; solve a coding problem with an unknown language (Fortran)

Groups	Exercise	Tested on how <i>they</i> solved <i>the problem</i> (from memory)
ChatGPT Group	Fastest to get a solution.	
Google Use Group	Slowest to get a solution.	

AI and Coding

Context on AI

- AI is dramatically changing software development
 - It can write code fast.
 - It can provide a (good?) analysis of code.
- Does this make software developers obsolete?
- I feel that to be an efficient developer with AI you must:
 - 1) Be an skilled software developer.
 - 2) Know how to efficiently use AI tools.



AI can make you 10 times as productive.
But you have to already be productive!

Why you need development skills?

- ..
- AI tools generate quantity over quality.
 - **You** must review the quality of generated code.
 - **You** must direct the AI how to meet your goals.
- **You** need the skills to know good code, and know what is needed to improve it.
 - This course is mainly about building your skills as a software developer.

- Lecture teaches us ideas, but most of us learn software development best by..
 - Assignments are how we code in this course.
- Our Coding Process:
 - a) Code a little (but of course it's wrong!)
 - b) Run it and see where output is incorrect, or
Read code and see it's a mess (design/details/...)
 - c) Find where in the code is the problem.
 - d) Decide how to correct the code.
 - e) Goto 1.
- ABCD - With a partner
Where in this does your learning happens?

Limit of AI

- AI Limits Learning
 - Using AI tools can..
 - This limits the skills you learn and stunts your growth.
- AI mostly "understands", most of the time
 - e.g.: asked to refactor code that used a Java interface, AI gave me 3 different ideas on how to instantiate an interface, but identical code for each!
- AI often favours Quantity over Quality
 - Some open source projects are banning AI because it creates a lot of low-quality code: experienced developers sift through to find good changes.
 - Benefits of AI use is an area of active research!

Use of AI in this course

- Use AI to help you learn by having it:
 - Explain code
 - Quiz you on course content
 - Discuss debugging when truly stuck
 - Get help like stack-overflow
e.g., "How to generate random number in C++?"
- Don't use AI to write your code.
Your value to a company is the skills you bring: you must be a strong developer to effectively use AI.
 - Don't let it make design decisions.
 - Don't let it write your code.
 - Don't let it refactor code to clean it up.

Things to Know

- 1) Don't use AI for anything you want to get better at:
use it as an aide to learning.
 - Humans have to struggle to learn.
- 2) Anything coming out of GenAI is not yours
regardless of the code you fed it.
- 3) Each assignment may have unique AI use requirements
 - Using too much AI is a violation of academic honesty:
Get 0 on the assignment & reported to university.
- 4) Course tries to grade learning not produced work.