UN – COGNITION

Un-cognition is not a real word, but it's the closest I've come to describing something I'm genuinely worried about, its the way large language models (LLMs) and generative AI can, if we are not careful, slowly erode our own willingness and ability to think. By un-cognition I mean the habit of offloading so much of our thinking to AI that we stop engaging deeply ourselves, until thinking feels harder and less natural than it used to.

In his fiery 1930 speech, **David Hilbert** [1]declared, "In opposition to the foolish **Ignorabimus, WE MUST KNOW! WE WILL KNOW!!!**" for those of you who do not know of Dr. Hilbert (and I assume a fair number of you), he was a what you call a mathematical superstar. He contributed to nearly every area of mathematics, **almost beat Einstein to general relativity,**[2] and his question "Is mathematics decidable?" helped **set the stage for the very computers and devices we have today**[3]. If you were cool, you might ask me, "How do you know all this? Did you Chat GPT it?" The answer is no. I learned it the old-fashioned way, by falling into a rabbit hole of articles while trying to understand Alan Turing and the Turing machine (really hoping you at least know him).

Now imagine I type "What's a Turing machine?" into one of the "pinnacle" LLMs of today. In one prompt I get everything, what it is, how it works, who invented it, why it matters. That's amazingly convenient, but the question that bothers me is that when I get this perfectly packaged explanation in a few seconds instead of crawling through ten messy websites, how much have I truly learned, and how much have I just consumed?

I am genuinely worried about what this means for my peers in research and for the students who will follow us. The heavy reliance on LLMs for homework, tests, and day-to-day tasks feels like it could chip away at our cognitive "muscles" over time. The group that worries me the most is students in junior, middle, and high school. Biology tells us that a lot of how our brain learns and handles information comes from neural connections formed while we are still growing. If at that stage, we outsource too much thinking and struggle to machines, what happens to the brain that never has to fully practice?

I have seen this in myself. I know how to write code to build a ResNet model, but at some point I decided to "go faster" by asking a language model "X" (X because I don't want to disappear) to write most of the boilerplate for me. Then I started using the same workflow for almost everything code, emails, answers, you name it. It felt efficient. Then one day I found myself in a precarious life or death situation just like Indiana Jones, no WiFi. I sat down to code the ResNet from scratch, something that should have been straightforward. Instead, I struggled to even recall some of the import statements. (**Note: this does not reflect my current ability as a CS student, thank you very much**)

Once I noticed this, I saw a pattern everywhere, for the tasks where I had heavily relied on LLM X writing emails, drafting explanations, even answering simple questions I had quietly become worse when forced to do them alone. It was not that I had never learned those skills, it was that I had stopped using them. **Un-cognition.**

Recent research is starting to put some data behind this kind of concern. In a CNN interview, MIT's Dr. Nataliya Kosmyna discussed a study where participants wrote texts either on their own, with web search, or with ChatGPT-like assistance [1]. The group using the LLM produced polished output with less effort but EEG data showed reduced brain connectivity, meaning they were putting

in less cognitive work. Later, when participants were suddenly asked to write without the AI, prior heavy users struggled more with memory and self attribution of what they had written. The study does not prove permanent "brain damage," but it does suggest that leaning too hard on AI can create a kind of cognitive debt, you get short term ease, but you may weaken your ability to operate when the tool disappears.

Another mini review by Klimova and Pikhart looks at artificial intelligence in higher education and student well-being [2]. They point out that, beyond academic issues, heavy dependence on AI in recreational or low effort contexts can reduce face to face social interactions, which may hurt interpersonal skills and emotional intelligence. **It's early work and not all negative, AI can also support learning and motivation but it flags a real risk. If AI becomes the default companion, we may stop practising the messier, slower, human parts of interacting and thinking together.**

A third paper from UT Austin digs into generative AI and human cognition through the lens of Bloom's revised taxonomy and metacognition [3]. Instead of new experiments, it offers a framework as more tasks are delegated to AI, we risk eroding the foundational skills of remembering, understanding, and analysing that higher order reasoning depends on. The authors call this "cognitive offloading" and argue that if we offload too much, too early, we may hollow out our own capacity for reflection, planning, and independent thought.

Put together, these studies do not say "LLMs will definitely cause mass cognitive decline." What they do say is that unreflective, heavy reliance on AI can reduce our cognitive engagement in the moment and may, over time, weaken skills we do not actively practise. That is the zone where I place "**UN-COGNITION**".

At the same time, I'm not anti AI and in my opinion (limited as it may be) as a CS student, I think artificial intelligence in its current and future forms is absolutely here to stay, and that is a good thing. I am genuinely excited about the possibilities of optimising electricity grids, accelerating drug discovery, preserving biodiversity, helping people learn in ways that were impossible before. The applications seem endless and yet, here I am writing about the negative impact it can have on the very people using it.

A great man once told me, "In the hands of a fool, even nectar can become poisonous." (that great man is my father, the nectar was a new phone and who the fool is, I will leave to your imagination) LLMs today are exactly like that nectar, the tools themselves are incredibly powerful and, in the right hands, beautiful. **But it is up to us to decide whether we use them as tools for learning or as substitutes for thinking.**

For students in particular, this choice matters. To be human, I believe is to think, to learn, and to reason. If we always let the model think first and we simply accept its answers, we risk becoming excellent prompters and poor thinkers. T**he real meaning behind Hilbert's "We must know, we will know" to me is, not that we will eventually know everything or have every answer, It is that in trying to find what we do not yet know, we push the boundaries of our own understanding. Sometimes we fail. Sometimes we realise there are things we simply cannot know. But in that process of searching, struggling, tinkering we discover new ideas that might, in some small way, change the world. Or at least in my case help me write this (I hope, pretty awesome) reflective paper.**

Before I take leave, I want to borrow your imagination. Assume I have successfully built a time machine and sent you to the heart of the Renaissance, 14th century Italy. You meet Leonardo da

Vinci!!! (exciting right) . You tell him about 2025 the whole shebang, computers, artificial intelligence, planes, satellites, driverless cars, Elon Musk (of course). He stares at you, understandably sceptical, and then asks you to build something small to prove you are not crazy.

Now ask yourself, with the skills and knowledge you personally have without your favourite LLM, what can you actually build?

*The way we answer that question individually and as a generation will decide whether AI becomes our nectar, or our **"Un-cognition"**.*

References

[1] https://en.wikipedia.org/wiki/David_Hilbert

[2] https://press.princeton.edu/ideas/was-einstein-the-first-to-discover-general-relativity? srsltid=AfmBOopJbwse47XfbF7rVLbk35dF7HJMz1d7A49pBgTARiX2ClU7HUFP

[3] https://www.philocomp.net/computing/hilbert.htm

[4] (https://doi.org/10.48550/arXiv.2506.08872)

[5] Klimova B, Pikhart M. Exploring the effects of artificial intelligence on student and academic well-being in higher education: a mini-review. Front Psychol. 2025 Feb 3;16:1498132. doi: 10.3389/fpsyg.2025.1498132. PMID: 39963679; PMCID: PMC11830699.

[6] (https://arxiv.org/pdf/2502.12447)