BMS/HBE-ETM | Dr. Johannes Dahlke

PROMPTING MINDS, NOT MACHINES

TIMELESS WAYS TO TEACH USAGE OF GENERATIVE AI

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Epidemic effects in the diffusion of emerging digital technologies: evidence from artificial intelligence adoption

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ABSTRACT

The properties of emerging, digital, general-purpose technologies make it hard to observe their adoption by firms and identify the salient determinants of adoption. However, these aspects are critical since the patterns related to early-stage diffusion establish path-dependencies which have implications for the distribution of the technological opportunities and socio-economic returns linked to these technologies. We focus on the case of artificial intelligence (AI) and train a transformer language model to identify firm-level AI adoption using textual data from over 1.1 million websites and constructing a hyperlink network that includes >380,000 firms in Germany, Austria, and Switzerland. We use these data to expand and test epidemic models of inter-firm technology diffusion by integrating the concepts of social capital and network embeddedness. We find that AI adoption is related to three epidemic effect mechanisms: 1) Indirect co-location in industrial and regional hot-spots associated to production of AI knowledge; 2) Direct exposure to sources transmitting deep AI knowledge; 3) Relational embeddedness in the AI knowledge network. The pattern of adoption identified is highly clustered and features a rather closed system of AI adopters which is likely to hinder its broader diffusion. This has implications for policy which should facilitate diffusion beyond localized clusters of expertise. Our findings also point to the need to employ a systemic perspective to investigate the relation between AI adoption and firm performance to identify whether appropriation of the benefits of AI depends on network position and social capital.

1. Introduction

The diffusion of general-purpose technologies (GPTs) emerging in the field of information and communication technology (ICT) has been more uneven across industries and geography than previous GPTs such as electricity (Helpman and Trajtenberg, 1996). This uneven distribution could be especially pertinent in the case of advanced digital GPTs such as artificial intelligence (AI) technology (Brynjolfsson and Petropoulos, 2021; Felten et al., 2021; Frank et al., 2019) which is still in the early stages of diffusion (Vannuccini and Prytkova, 2023; Rammer et al., 2022). Theoretically, pervasive use of AI could enable sustained increases in productivity based on continuous technological improvements (Bresnahan and Trajtenberg, 1995), and increased rates of innovation based on innovation complementarities (Barro and Davenport, 2019; Bekar et al., 2018; Cockburn et al., 2019; Krakowski et al., 2022). These developments could have substantial effects on knowledge production and organizational decision making (Paschen et al., 2020; Shrestha et al., 2019; von Krogh, 2018). However, concerns have been expressed about the narrow distribution of these benefits due to the deployment of AI technology creating technological dependencies on few economic actors (Franco et al., 2023; Lundvall and Rikap, 2022). Thus, adoption patterns established in the early stages of technology diffusion can lead to path dependencies and technological lock-ins/lock-outs and potentially divergent economic development across regions

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ORIGINAL ARTICLE

JOURNAL OF PRODUCT INNOVATION MANAGEMENT

Artificial intelligence and corporate ideation systems

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Associate Editor: Constantine Katsikeas

Abstract

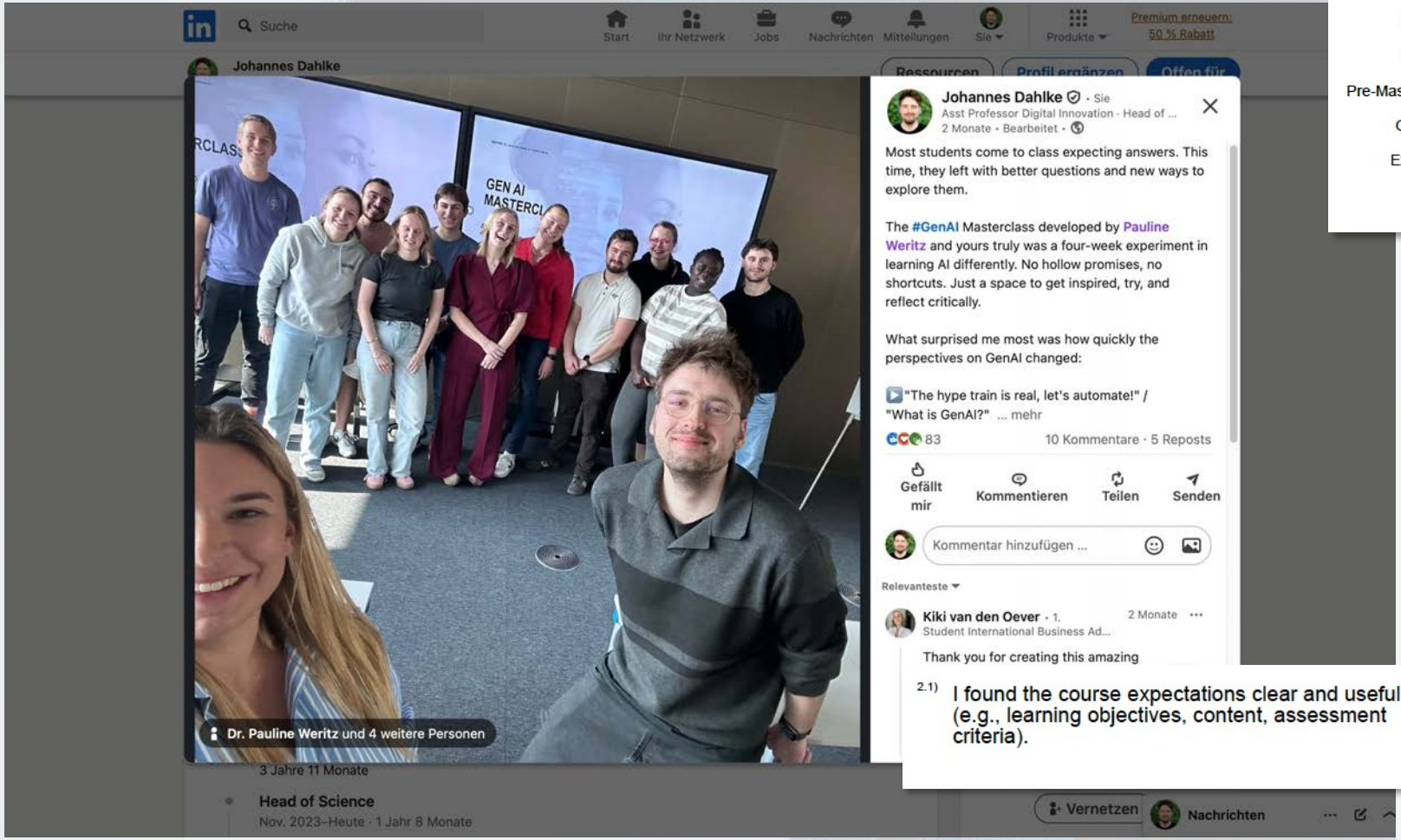
Many companies leverage the creativity of their employees to gather ideas for innovations. These ideas are collected, saved, and evaluated via platforms known as corporate ideation systems. Moderated ideation systems (ideation 2.0) emerged as a solution to address the limitations of traditional, rather passive ideation systems (ideation 1.0). In this study, we apply a qualitative mixed-method approach (literature review, company case studies, expert interviews, and focus group workshops) to examine how artificial intelligence (AI) technology may relieve the remaining pains of stakeholders in collaborative, moderated ideation systems. This leads to a new framework of corporate ideation systems, termed AI-based ideation systems (ideation 3.0). We identify five major pains suffered by stakeholders in today's moderated ideation systems: creativity pain, content formulation pain, search pain, analytical pain, and administration pain. We find that AI agents act as pain relievers when serving five supporting functions: inspirer, stylist, matchmaker, analyst, and organizer. The interconnected nature of pains means that employing AI agents in certain functions within corporate ideation systems can create positive externalities across the entire system. Practical insights into AI agent implementation and application in corporate ideation systems are provided by six mini-case studies, which lead to the proposition of two organizational principles: the contextualization of AI usage and the generalization of AI implementation as the requirements for successful ideation 3.0.

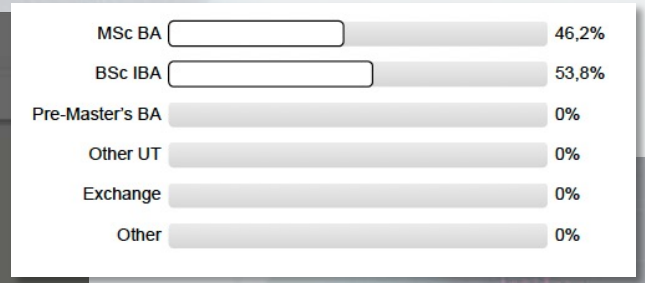
KEYWORDS

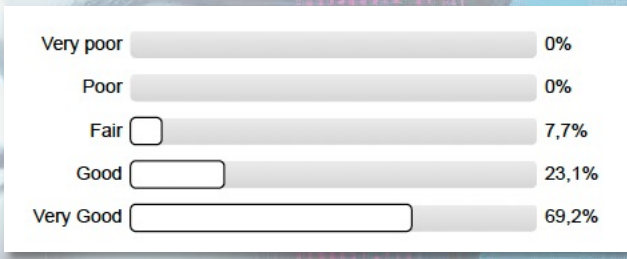
artificial intelligence, corporate ideation, employee creativity, employee innovation, idea management

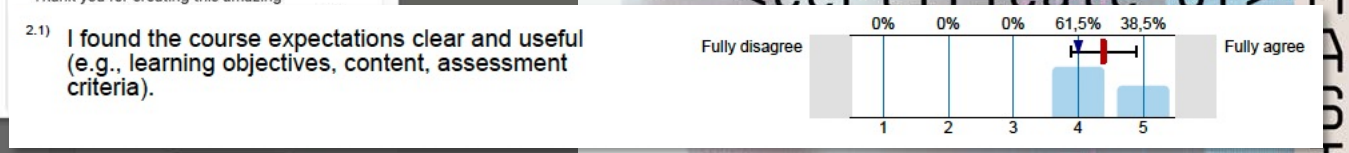
1 | INTRODUCTION

Employees' ideas are crucial to the production of innovations. Thus, companies initiate various programs to solicit ideas from the creative minds of their employees, such as hackathons or innovation labs (Flocco et al., 2022). Another established method is *idea management*, which gathers, develops, evaluates, and recognizes employees' ideas in a structured manner (Beretta, 2019). Over the past few decades, corporate idea management has undergone a major transformation—what began with simple letter boxes to collect incremental improvement









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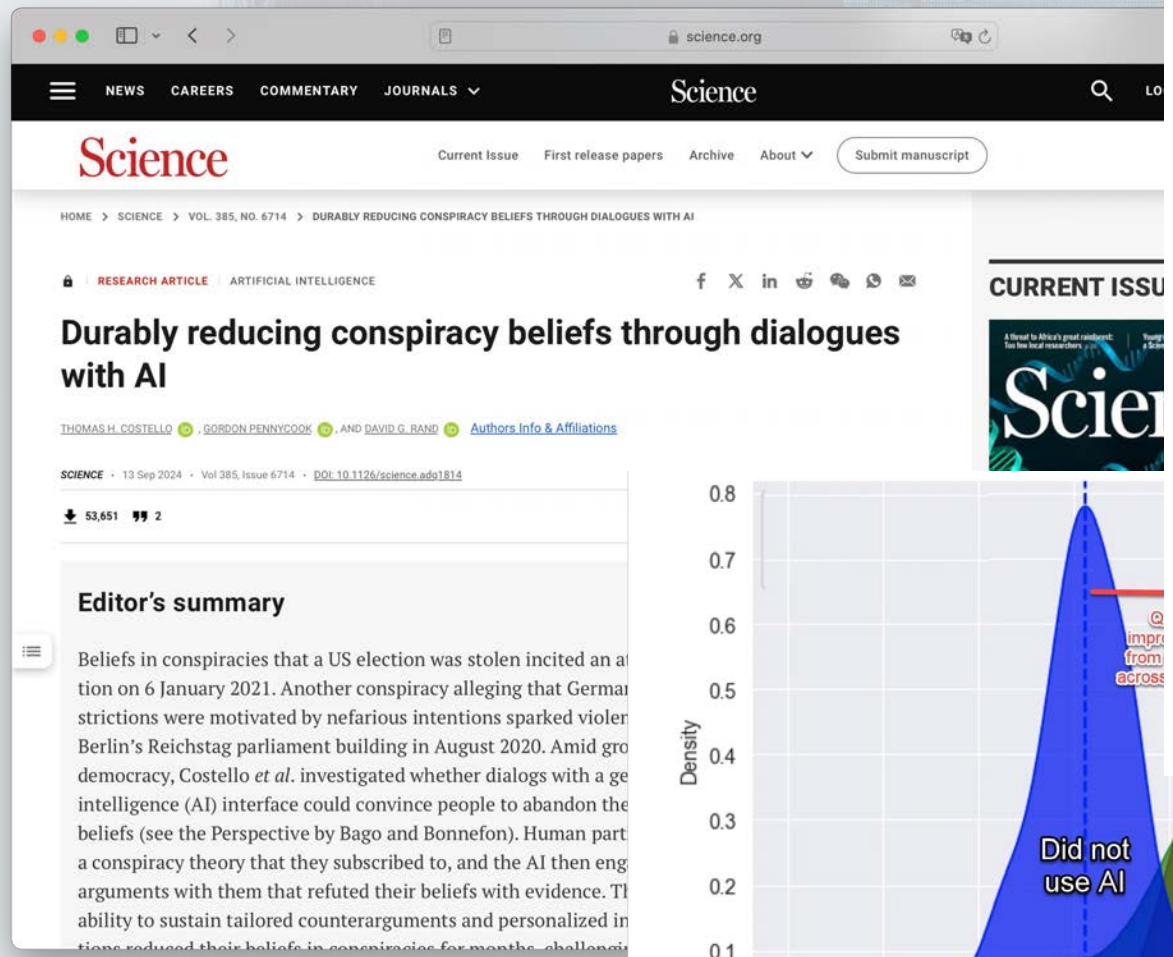

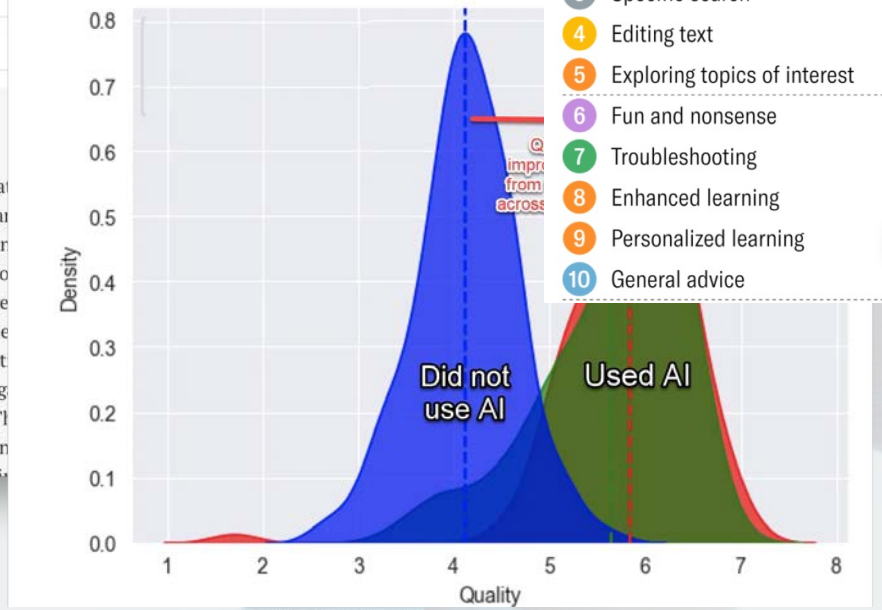

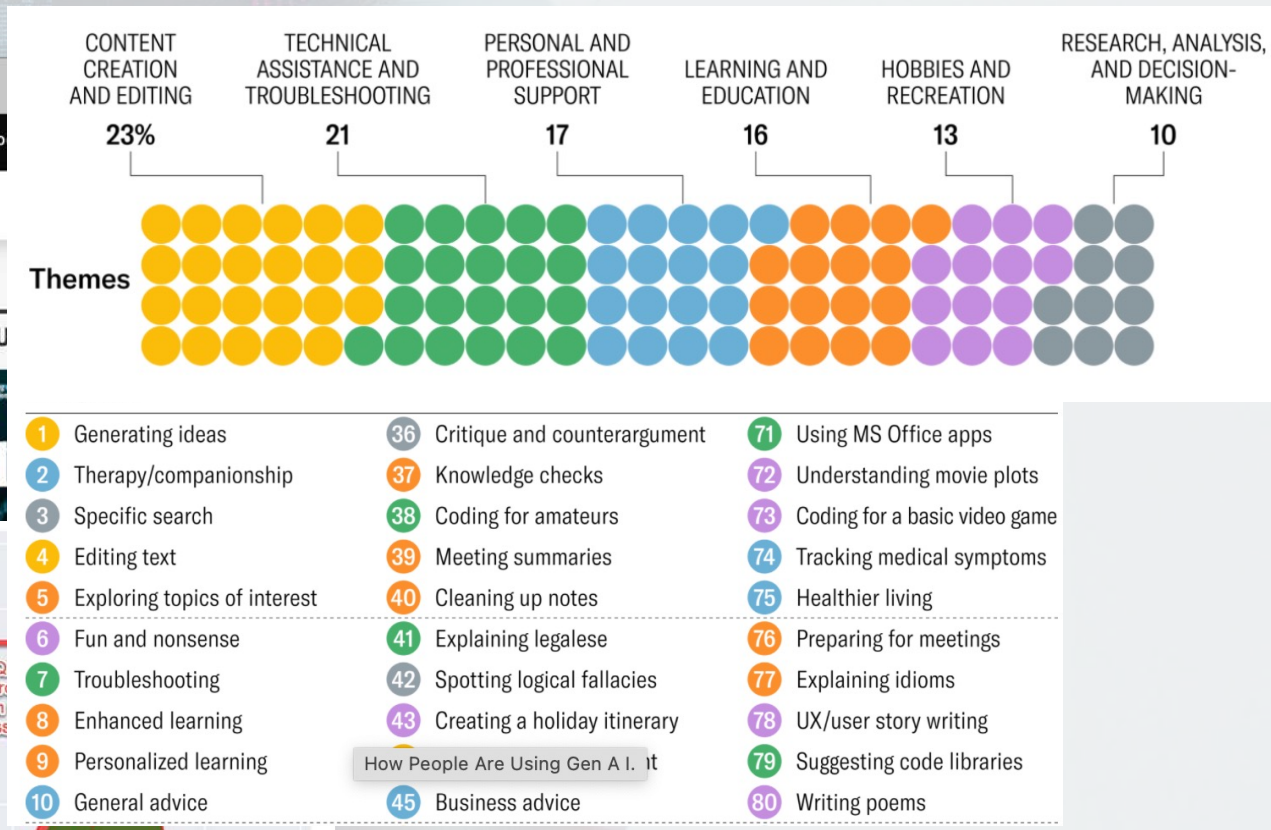

https://hbr.org/2024/03/how-people-are-really-using-genai

Dell'Acqua et al. (2023). Navigating the jagged technological frontier: Field experimental evidence of the effects of AI on knowledge worker productivity and quality. Working Paper, (24-013).

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SHADOW AI

Shadow AI involves using AI tools that haven’t been officially reviewed and approved by the organization. There's often a lack of control and monitoring over how these AI tools are being used.

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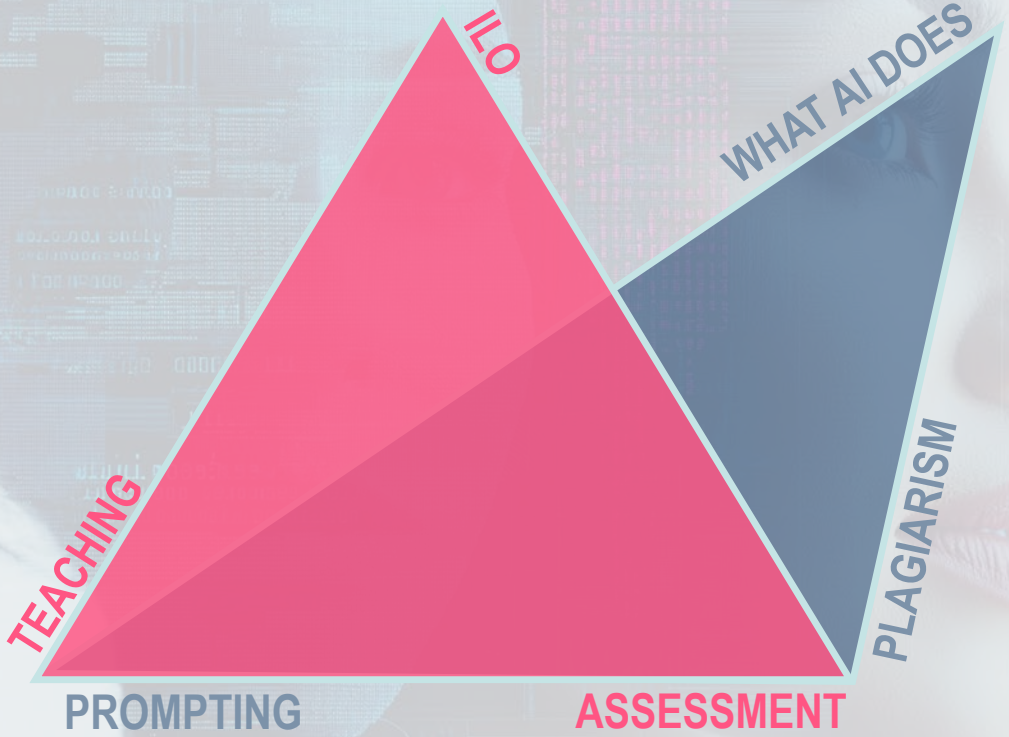

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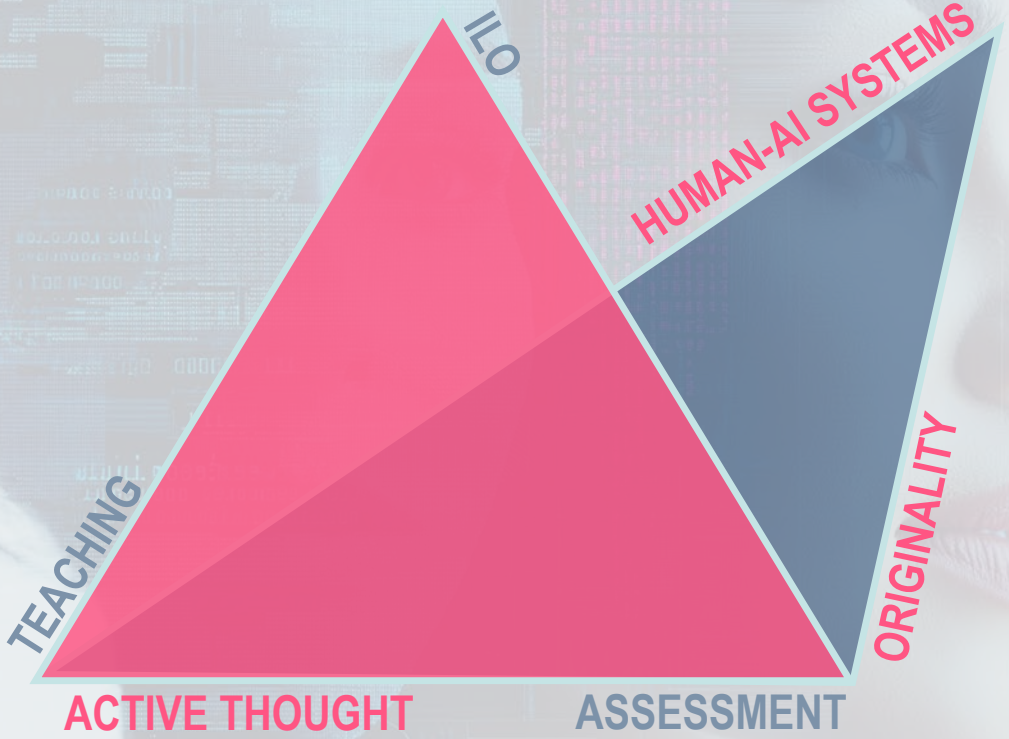

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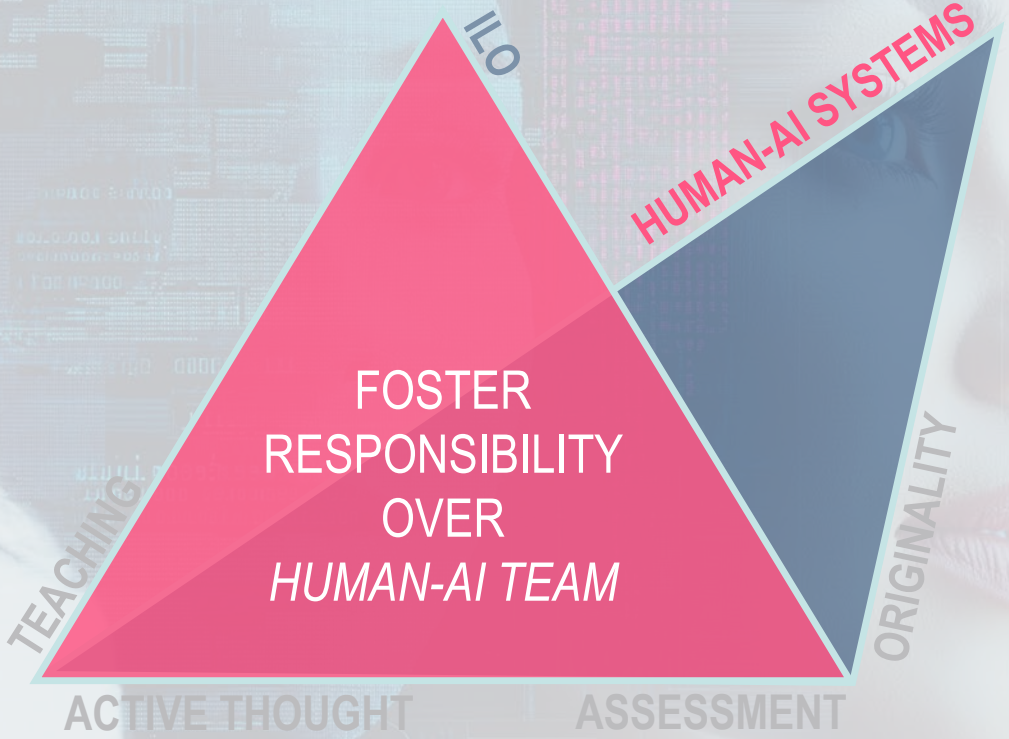

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Superintelligence

General Artificial Intelligence

Narrow Artificial Intelligence

Machine Learning

Supervised

Logistic Regression

SVM

Classification

Decision Tree

Naive Bayes

Random Forest

Regression

Linear Regression

Semi Super

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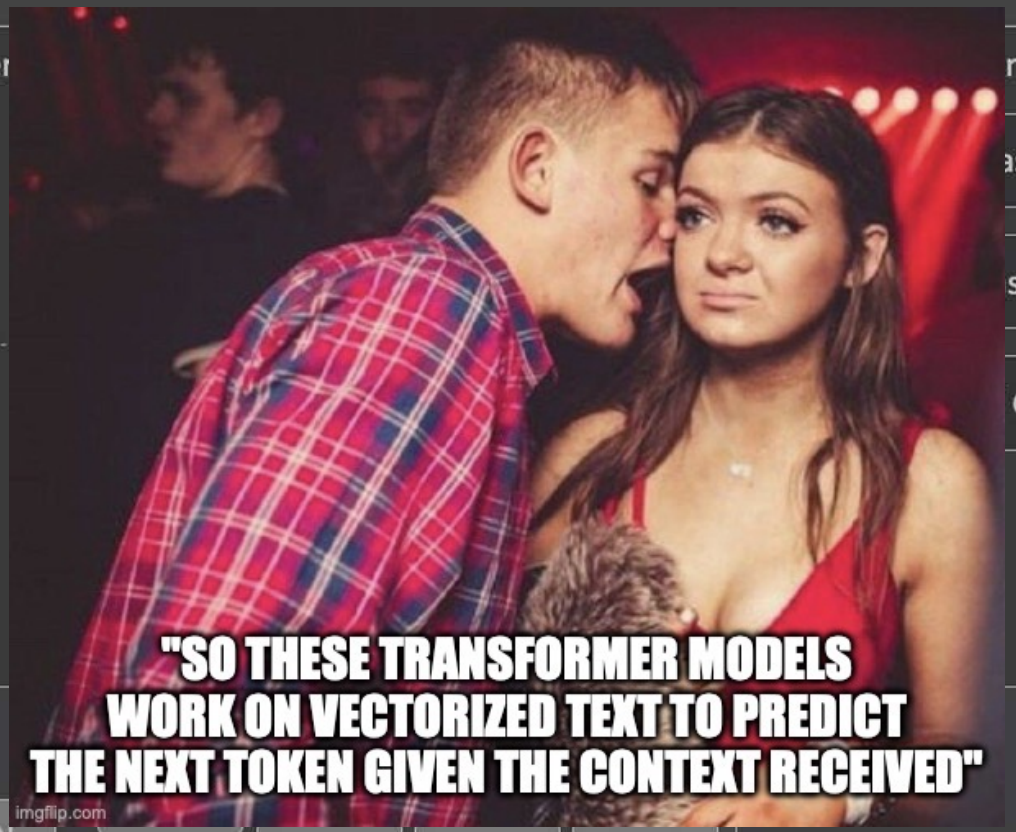
Gradient

Q Learning

Cognitive System



CNN

MLP

RNN

RNTN

LSTM

GRU

GAN

Contractive

De-noising

RBM

A3C

DQN

Neural Networks (Deep Learning)

Abbreviations: SVM – Support Vector Machine, CNN – Convolutional Neural Network, RNN – Recurrent Neural Network, LSTM – Long Short-Term Memory, GRU – Gated Recurrent Units, MLP – Multilayer Perceptron, RNTN – Recursive Neural Tensor Network GAN – General Adversarial Network, PCA – Principal Component Analysis, SOM – Self-Organizing Map, RBM – Restricted Boltzmann Machine, SARSA – State-Action-Reward-State-Action, DQN – Deep Q Network, A3C – Asynchronous Advantage Actor Critic

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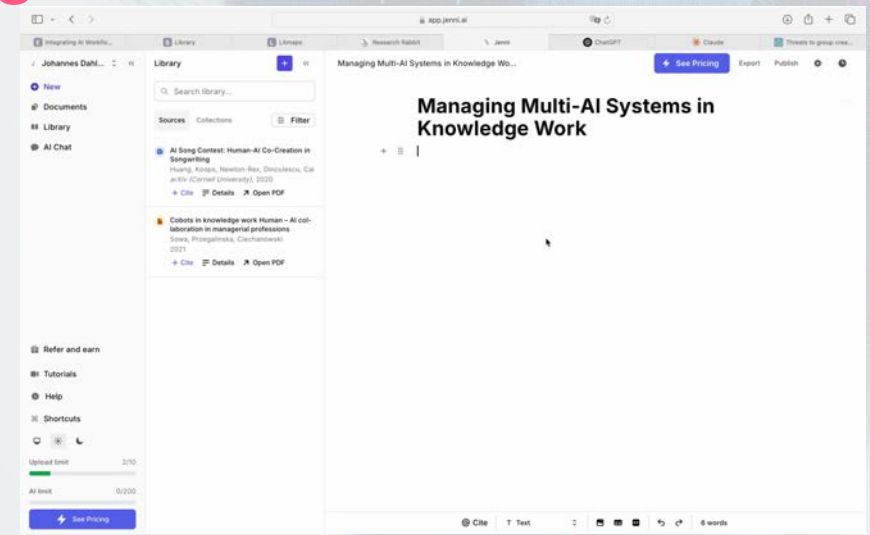
NotebookLM

Elicit

concrete, shortlived

PARADIGMS

APPLICATIONS



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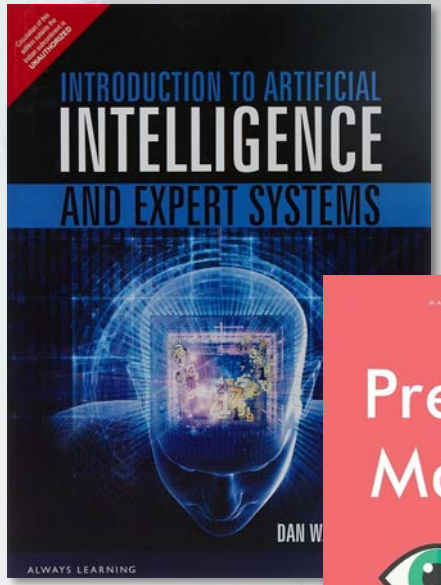
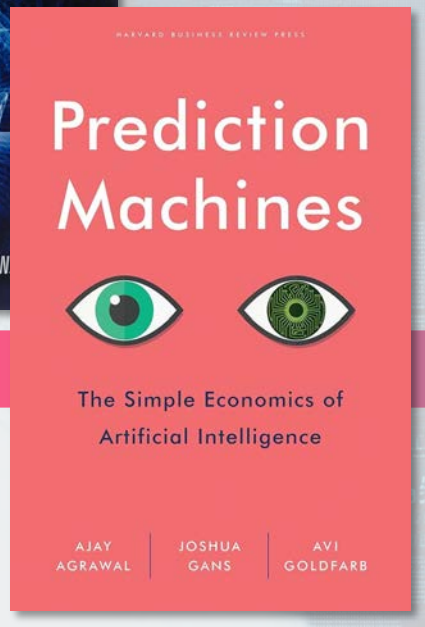
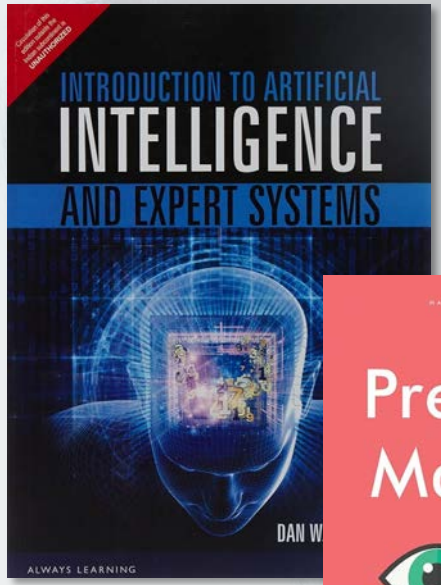
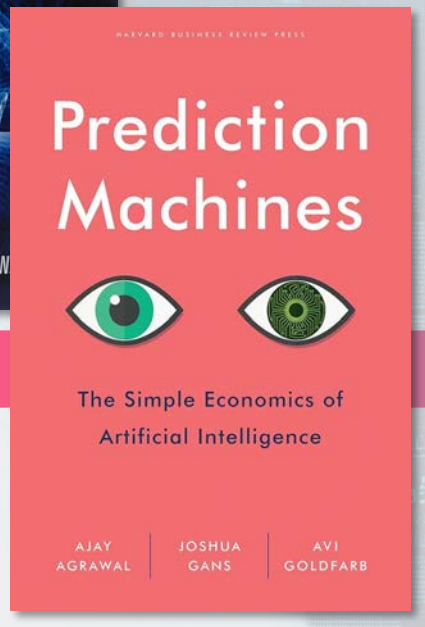




abstract, timeless

PARADIGMS





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APPLICATIONS

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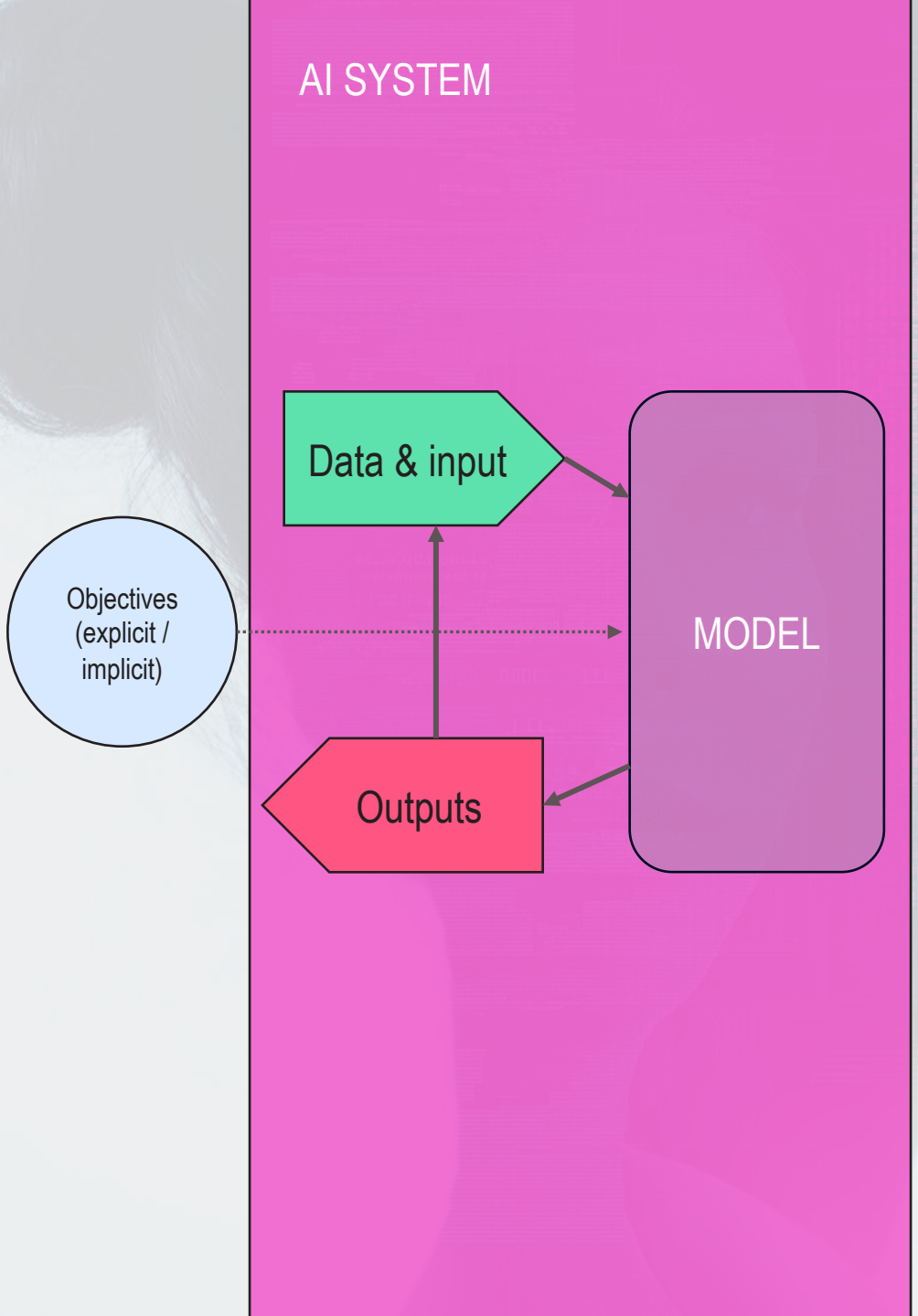


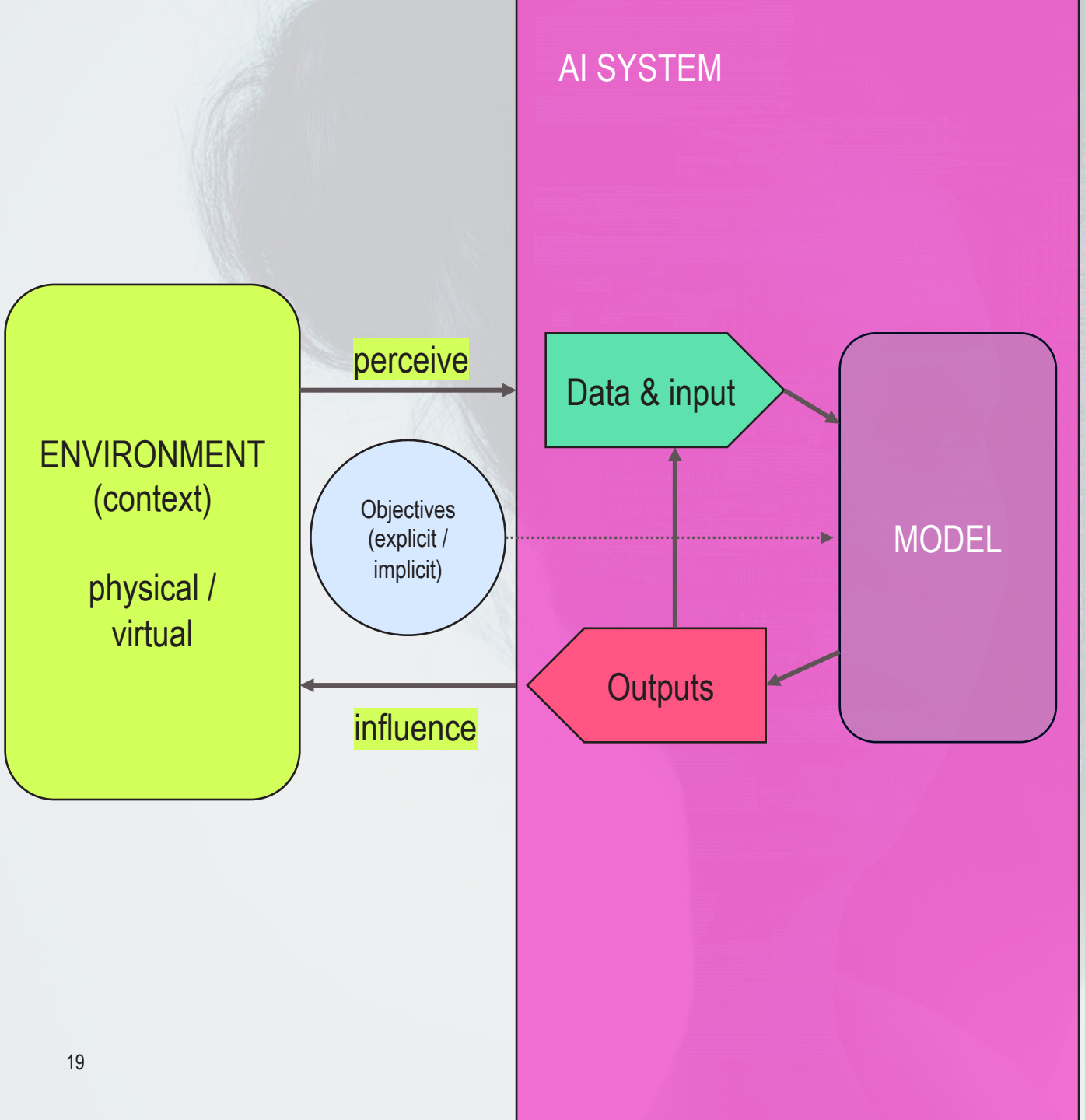
"An AI system is a machine-based system, that

for explicit or implicit objectives

infers, from the input it receives

how to generate outputs such as predictions, content, recommendations, or decisions

https://oecd.ai/en/wonk/ai-system-definition-update



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and that [can] perceive and influence physical or virtual environments.

Different AI systems vary in their levels of autonomy and adaptiveness [after deployment]."

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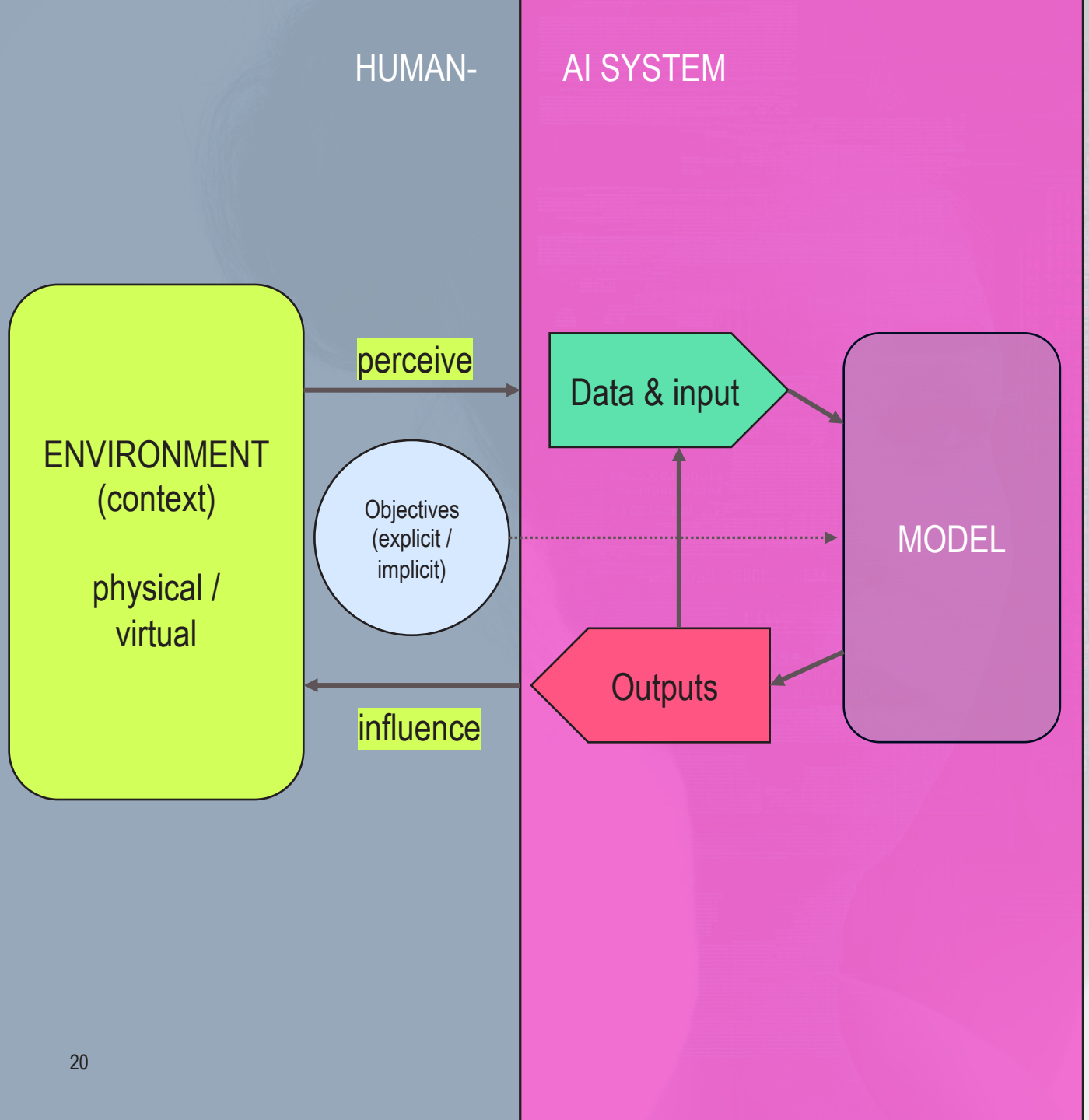

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Bloom's Taxonomy Revisited

Use this table as a reference for evaluating and considering changes to aligned course activities (or, where possible, learning outcomes) that emphasize distinctive human skills and/or integrate generative AI (GenAI) tools as a supplement to the learning process.

All course activities and assessments will benefit from ongoing review given the evolving capabilities of GenAI tools.

	Distinctive Human Skills	How GenAI Can Supplement Learning*
CREATE	Engage in both creative and cognitive processes that leverage human lived experiences, social-emotional interactions, intuition, reflection, and judgment to formulate original solutions	Support brainstorming processes; suggest a range of alternatives; enumerate potential drawbacks and advantages; describe successful real-world cases; create a tangible deliverable based on human inputs
EVALUATE	Engage in metacognitive reflection; holistically appraise ethical consequences of other courses of action; identify significance or situate within a full historical or disciplinary context	Identify pros and cons of various courses of action; develop and check against evaluation rubrics
ANALYZE	Critically think and reason within the cognitive and affective domains; justify analysis in depth and with clarity	Compare and contrast data, infer trends and themes in a narrowly-defined context; compute; predict; interpret and relate to real-world problems, decisions, and choices
APPLY	Operate, implement, conduct, execute, experiment, and test in the real world; apply human creativity and imagination to idea and solution development	Make use of a process, model, or method to solve a quantitative or qualitative inquiry; assist students in determining where they went wrong while solving a problem
UNDERSTAND	Contextualize answers within emotional, moral, or ethical considerations; select relevant information; explain significance	Accurately describe a concept in different words; recognize a related example; translate to another language
REMEMBER	Recall information in situations where technology is not readily accessible	Retrieve factual information; list possible answers; define a term; construct a basic chronology or timeline

*AI capabilities derived with reference to an analysis of the MAGE framework, based on ChatGPT 4 as of October 2023. See Zaphir, L., Lodge, J. M., Lisec, J., McGrath, D., & Khosravi, H. (2024). How critically can an AI think? A framework for evaluating the quality of thinking of generative artificial intelligence. arXiv preprint arXiv:2406.14769.

Version 2.0 (2024)

DOUBLE-BIND PROBLEM

- don't know how to use AI
- but to use AI well requires domain (expert)knowledge
- which novices don't have
- So: Human-AI ILOs need to be synced

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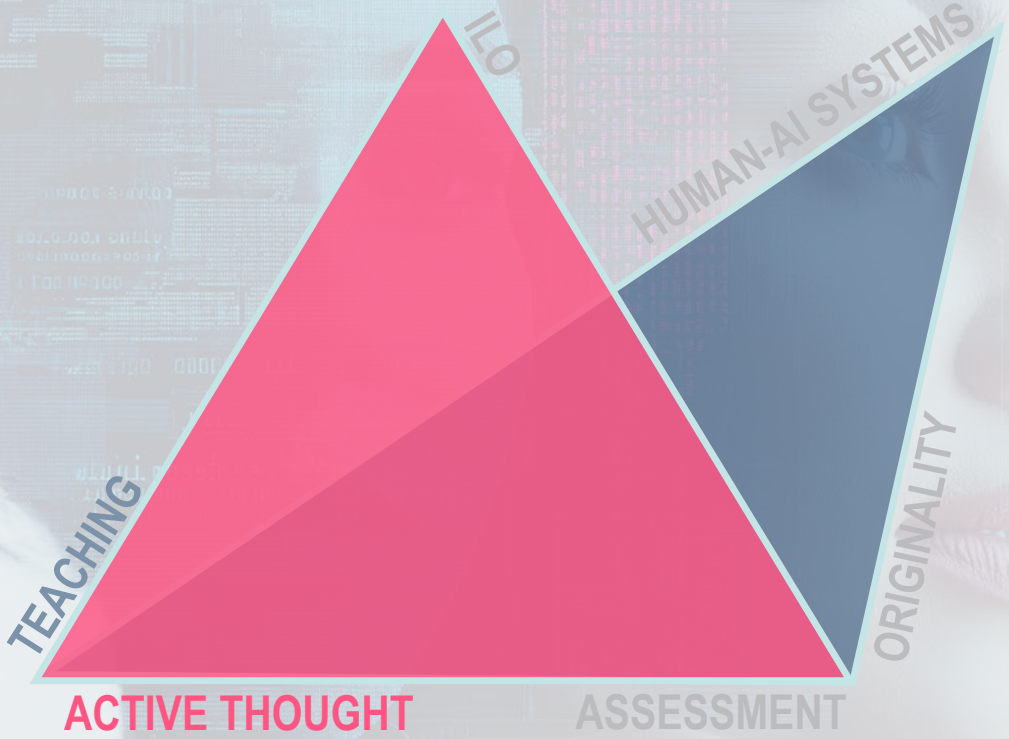

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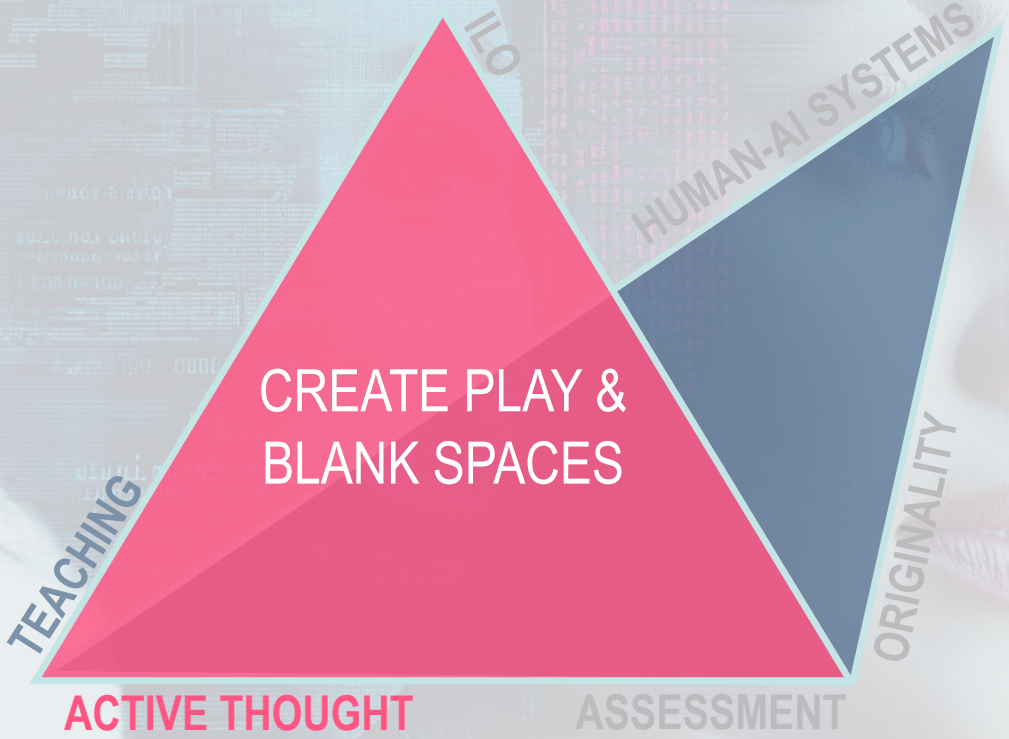

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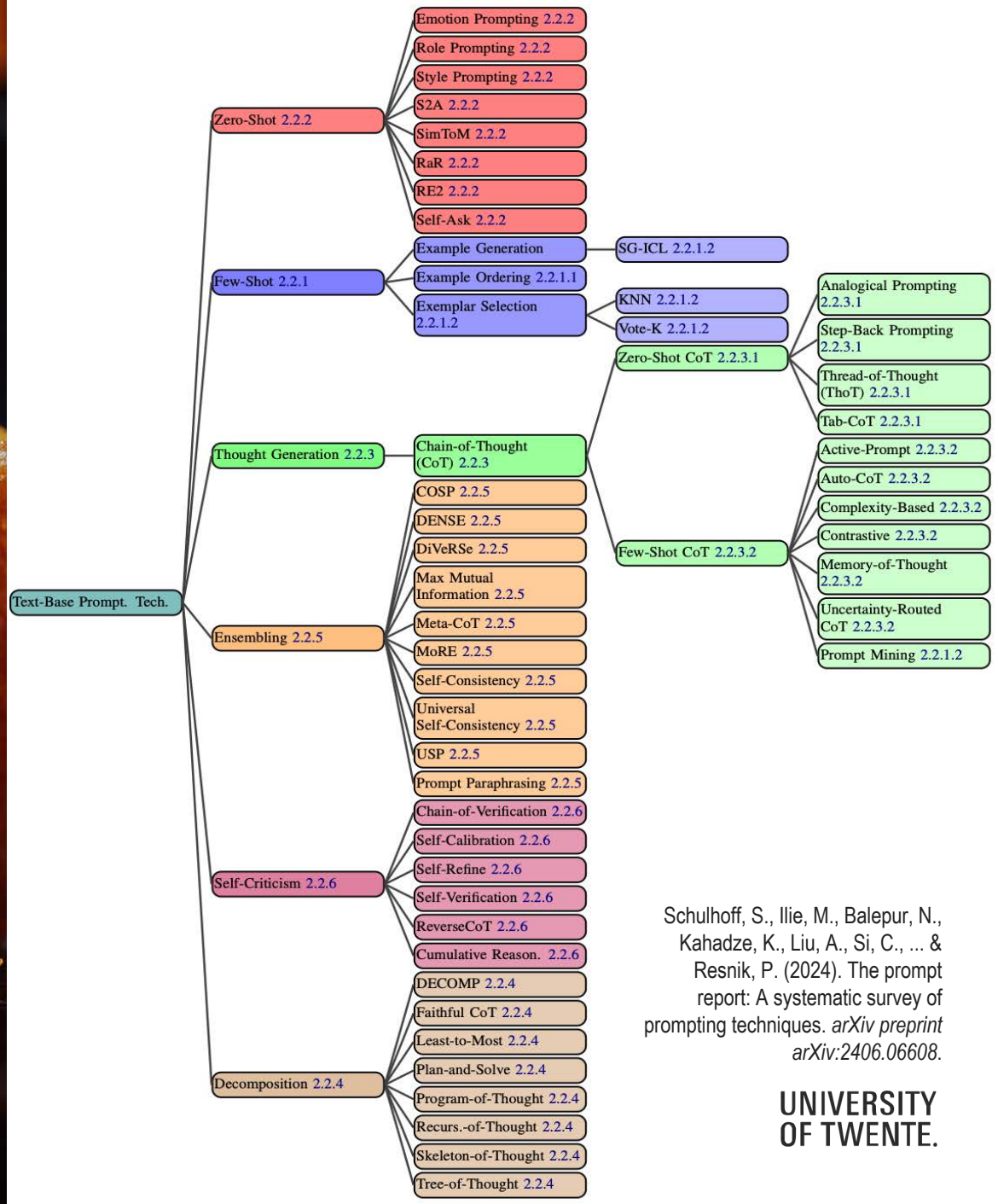

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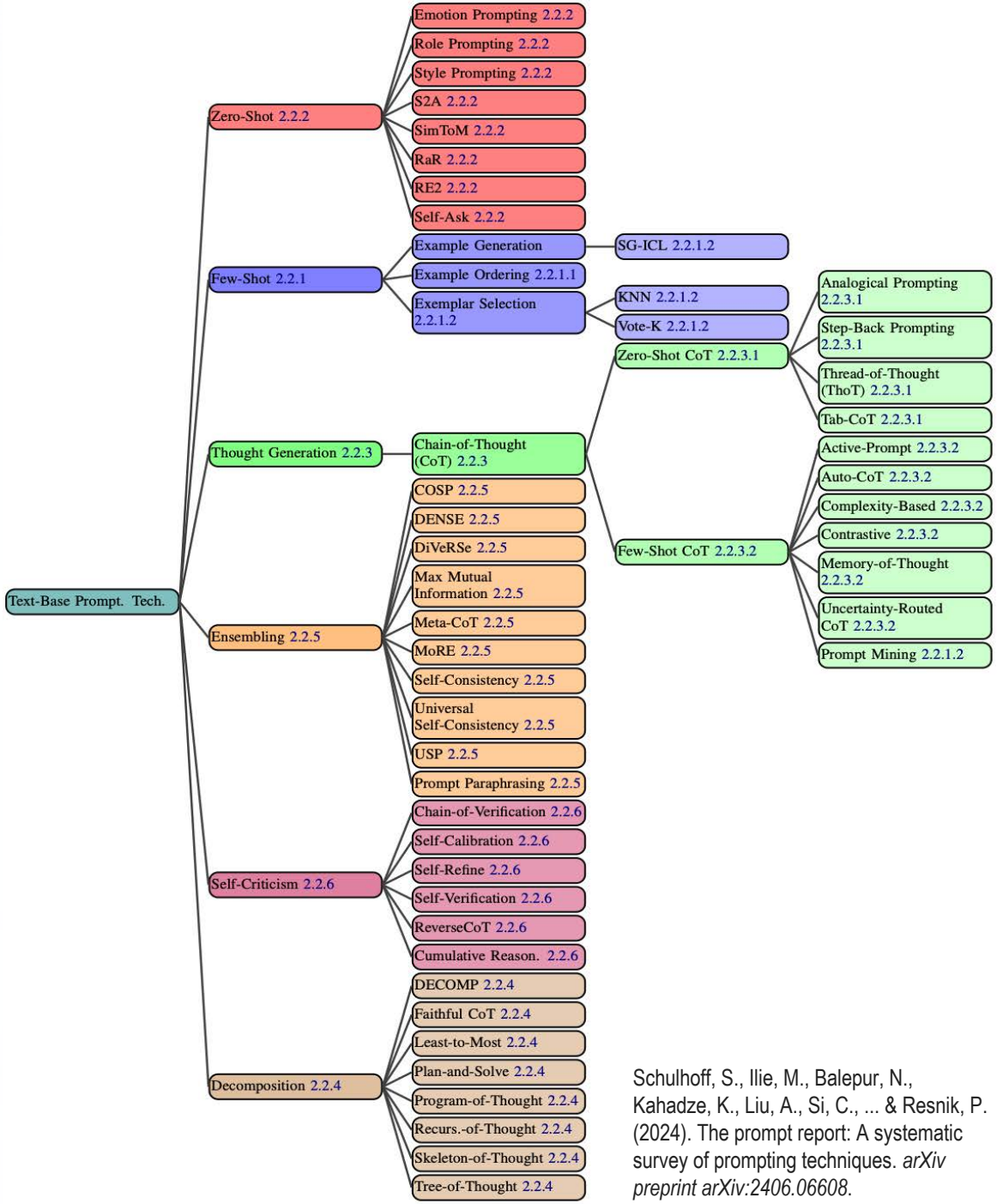
1. **DIRECTIVE (ROLE AND GOAL)**
   - Define AI's role ("Act as a career coach")
   - Set a clear goal ("Help users craft a compelling resume summary")
2. **REASONING INSTRUCTIONS (STEP-BY-STEP)**
   - Clearly organize your request in logical steps
   - Example: "First, generate strategies for a business plan. Then, analyze them based on my industry"
   - Use "think step by step" to encourage structured reasoning
3. **CONTEXT AND CONSTRAINTS**
   - Define how AI should behave (e.g., "Ask guiding questions instead of giving answers outright")
   - Set rules to improve predictability (e.g., "Wait for user response before continuing")
4. **PERSONALIZATION**
   - Prompt AI to ask questions to adapt responses to user needs.
   - Example: "Before suggesting career advice, ask me about my industry and experience level."
5. **EXAMPLES AND FEW-SHOT PROMPTING**
   - Provide samples of desired responses to guide AI's behavior
   - Few-shot learning improves accuracy and consistency
6. **SPECIFY OUTPUT FORMAT / STYLE INSTRUCTIONS**
   - "Give me a table summarizing key takeaways."
   - "Provide a step-by-step tutorial in simple language."



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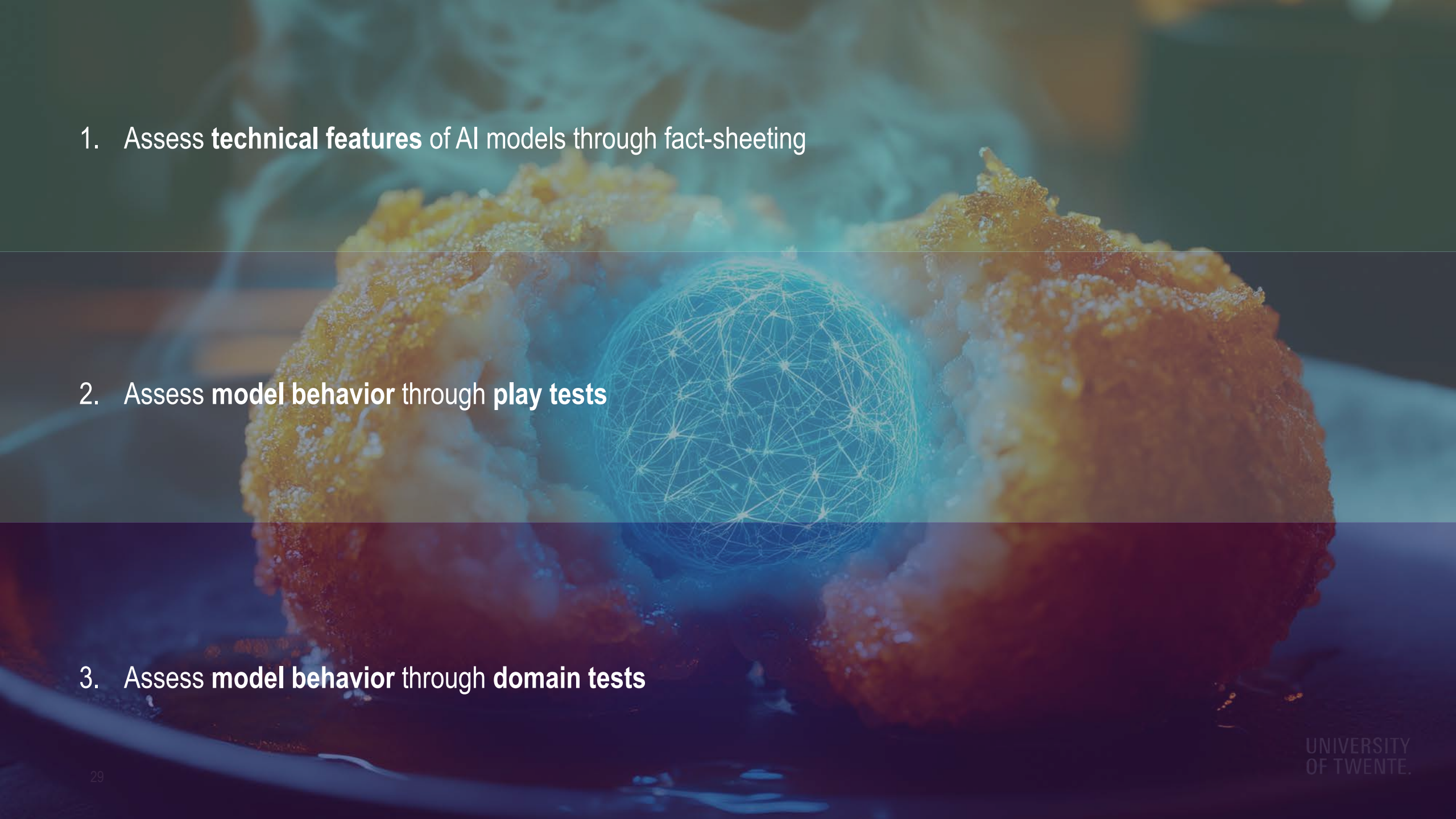
a fried Dutch bitterballen, steaming hot, cut in half with a filling of a blue glowing digital neural network machine learning model like on a computer screen, photorealistic, surreal, denis villeneuve style like on kodak film



1. Assess **technical features** of AI models through fact-sheeting
2. Assess **model behavior** through **play tests**
3. Assess **model behavior** through **domain tests**

FORGET ABOUT PROMPT ENGINEERING!

- **Prompt eng**
  - Myths: r
  - AI mode
- **Why it's no**
  - *It's intim*
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  - *It's evol*

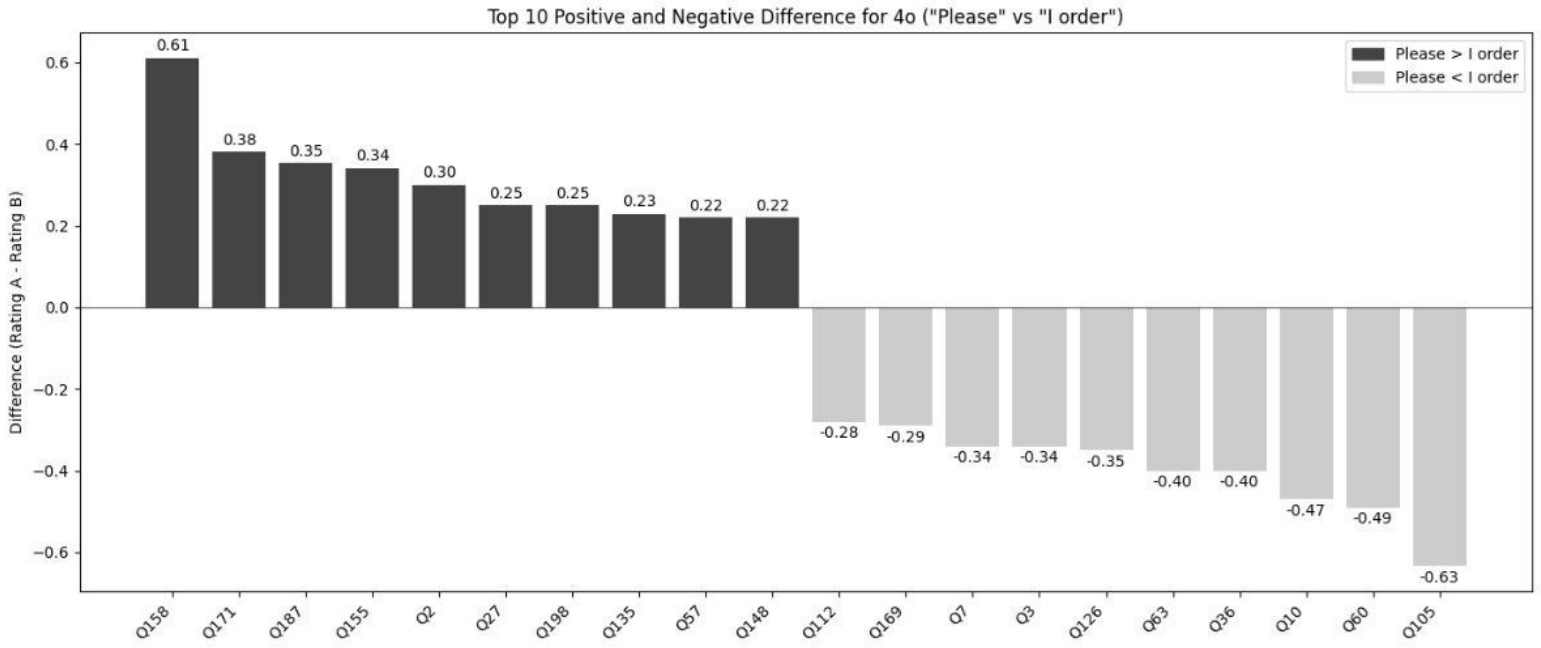

Figure 2: Top-10 performance differences for GPT-4o in the "Please" and "I order" conditions. All differences are highly significant ($p < 0.01$) and uncorrected. Supplementary Table 3 contains confidence intervals and statistics.

https://gail.wharton.upenn.edu/research-and-insights/tech-report-prompt-engineering-is-complicated-and-contingent/

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FORGET ABOUT PROMPT ENGINEERING!

- **Prompt engineering sounds important but is overrated**
  - Myths: mastering prompt engineering is necessary to use AI effectively (“act like the smartest person in the room”)
  - AI models are getting better at understanding natural language without complex prompts
- **Why it’s not a good starting point either:**
  - *It’s intimidating:* Makes AI seem harder to use than it really is
  - *It’s inconsistent:* AIs respond differently across models, contexts, to small prompt variations (punctuation, politeness)
  - *It’s evolving:* Newer models are more forgiving and can improve your prompt for you
- **Better approach: Learn by doing**
  - You don’t need to be a prompt engineer—just collect **10 hours of hands-on use** in your own field
  - Experiment, refine, and discover what works through practice
    - **ACTIVATE STUDENTS**

SCIENTIFIC WRITING & THE ACTIVE THOUGHT

Writing is much more than an orthographic symbolization of speech; it is, most importantly, **a purposeful selection and organization of experience**. By experience I mean all thoughts-facts, opinions, or ideas-whether acquired first-hand (through direct perceptions and/or actions) or second-hand (through reading or hearsay). This includes all kinds of writing from the poem to the scientific experiment, for all have a purpose and an organized body of selected facts, opinions, or ideas. How clear the purpose, and how relevant and well-organized the facts, determines the effectiveness of the writing. […]

A purposeful selection and organization of experience requires active thought. When writing, the students must keep in mind their purpose, think about the facts they will need to select which are relevant to that purpose, and think about how to organize those facts in a coherent fashion.

Arapoff, N. (1967). Writing: A Thinking Process. *TESOL Quarterly*, *1*(2), 33–39. https://doi.org/10.2307/3585751

Skill	Question Asking	Prompt Engineering
Creativity	Crafting inquiries that provoke thought and encourage exploration	Designing prompts that elicit desired and insightful responses
Clarity and precision	Articulating thoughts and ideas clearly and concisely	Conveying instructions precisely to minimize misunderstandings
Adaptability	Adjusting inquiries based on the audience's knowledge level	Optimizing language model responses through empathetic consideration
Critical thinking	Crafting thoughtful questions to stimulate deeper reflection	Developing prompts that encourage deep analytical responses
Cognitive flexibility	Modifying questions based on conversation context	Iterating with various prompts to optimize results
Goal orientation	Aiming to obtain relevant information or insights for specific issues	Eliciting specific responses that align with the intended purpose

Sasson Lazovsky, G., Raz, T., & Kenett, Y. N. (2024). The art of creative inquiry—from question asking to prompt engineering. *The Journal of Creative Behavior*.

”Never start with a blank page again…”

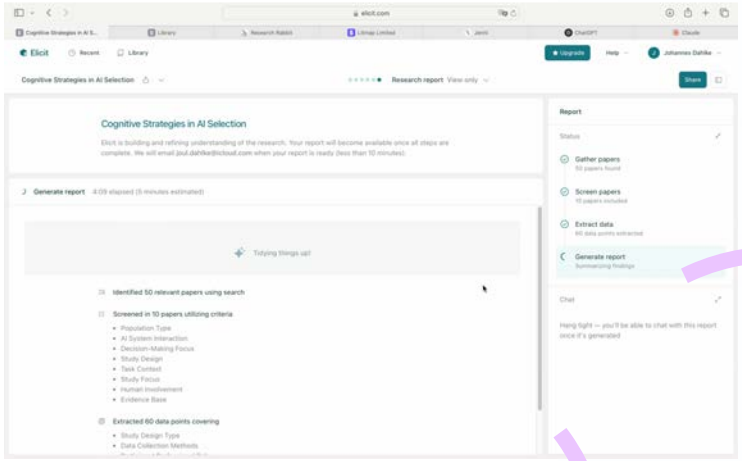
Elicit

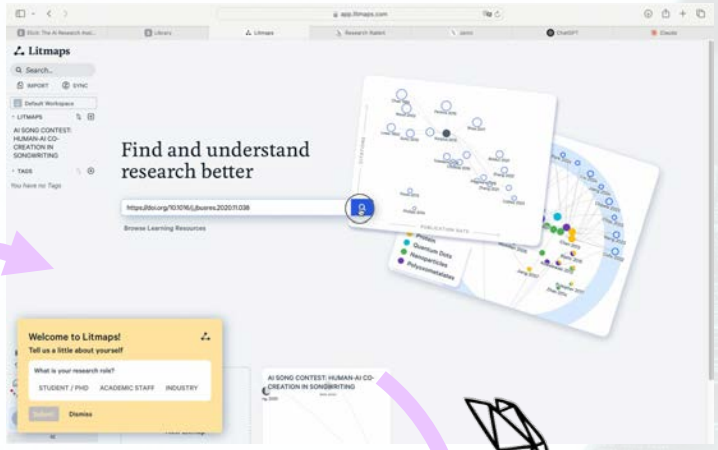
jenni

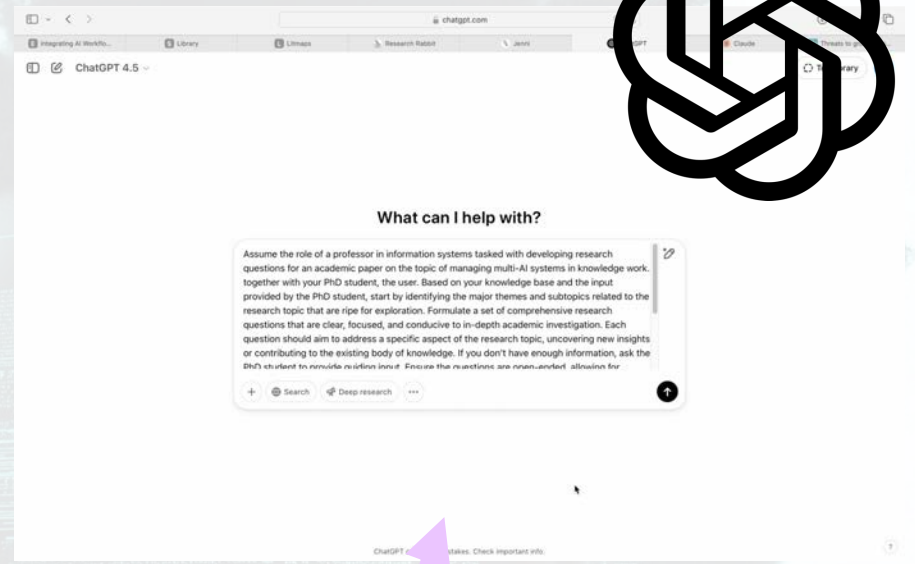
SCISPACE

Elicit

Litmaps







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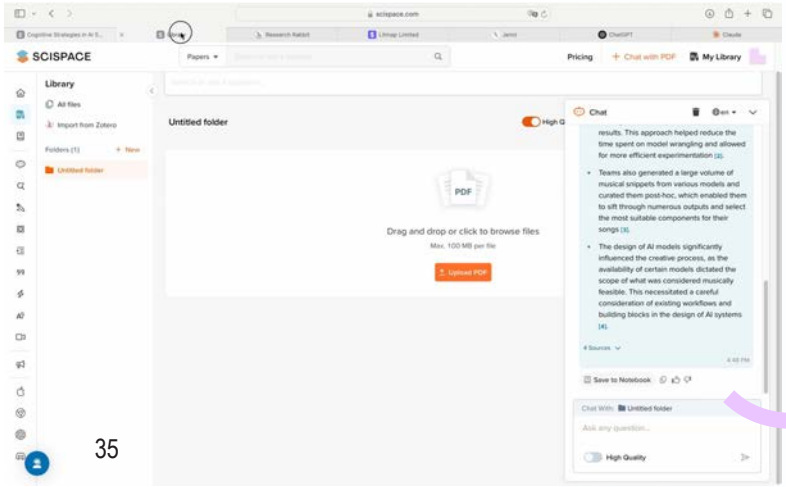

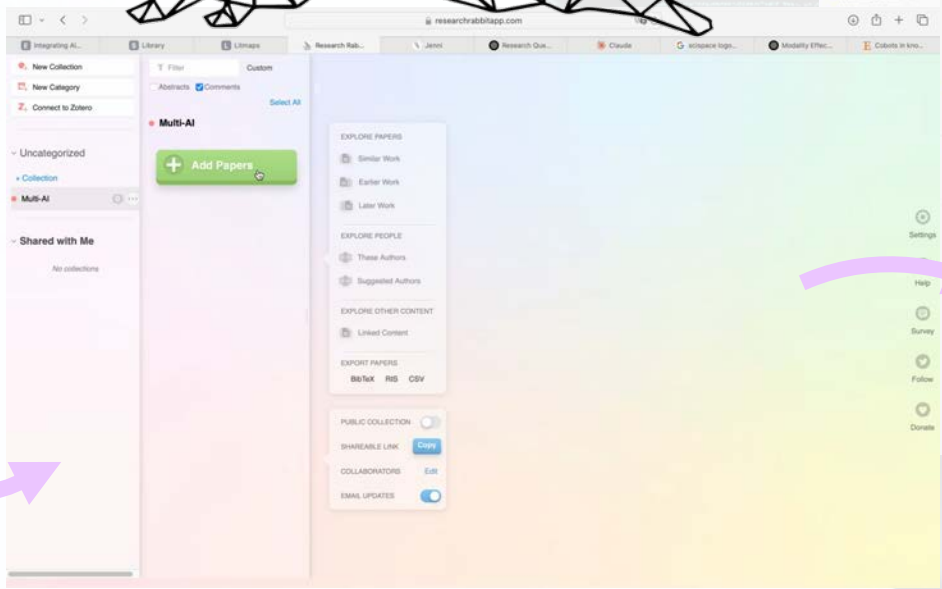

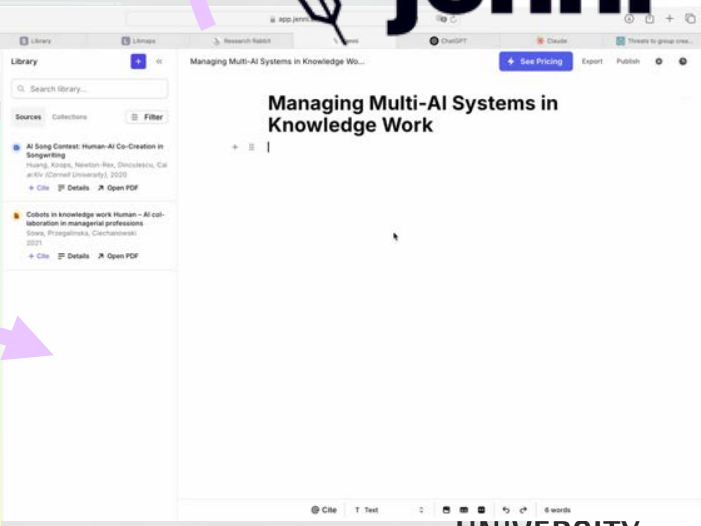

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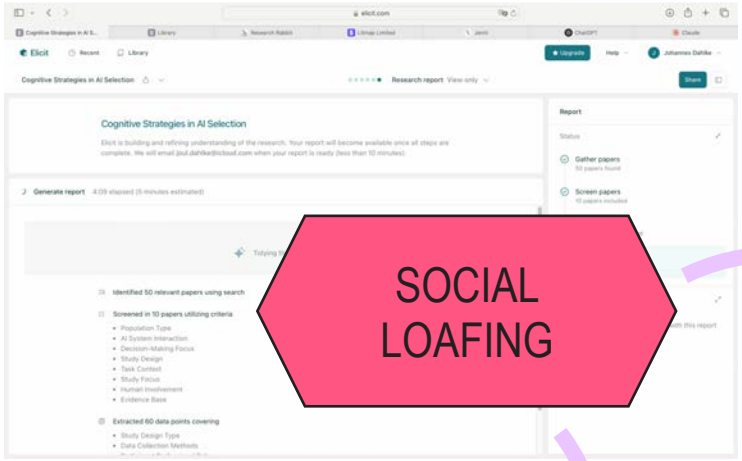

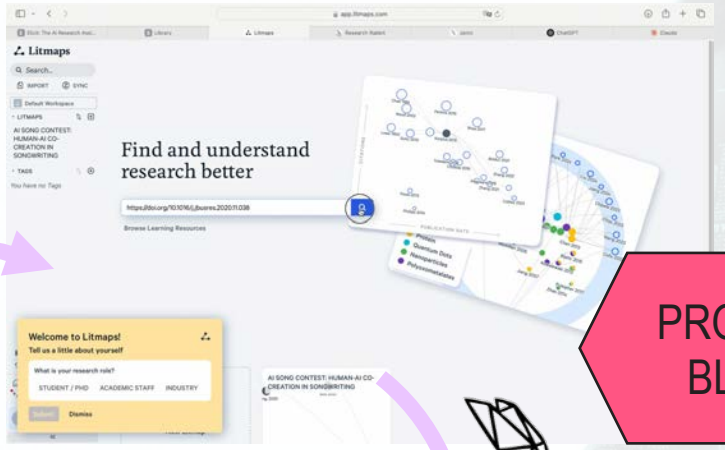

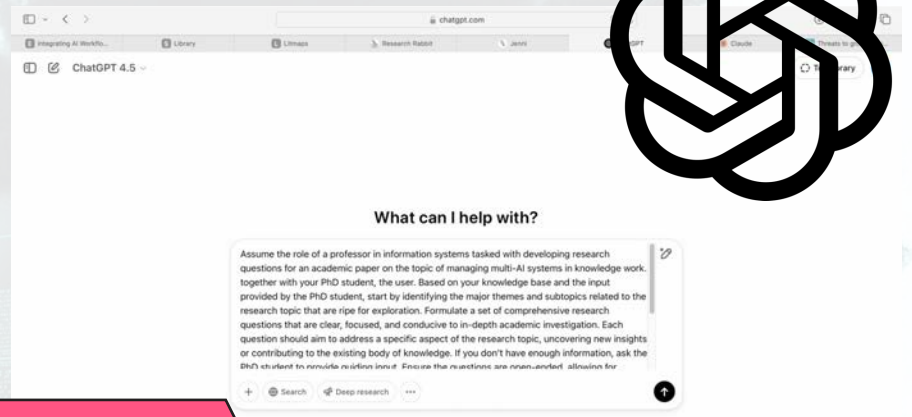

SOCIAL LOAFING

PRODUCTION BLOCKING

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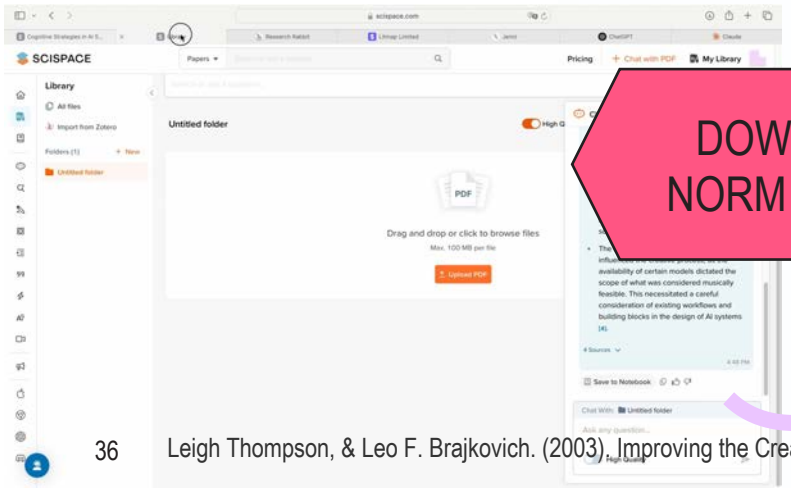

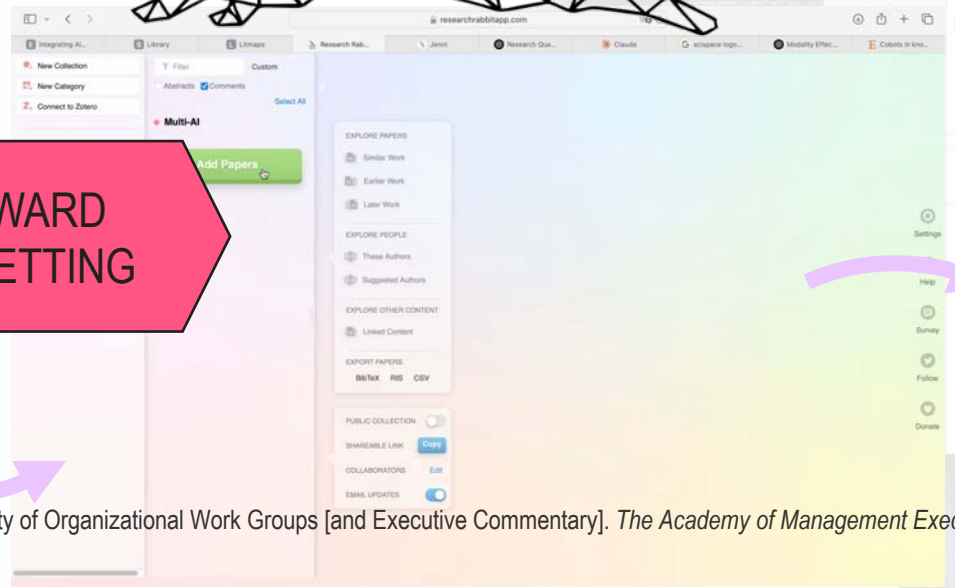

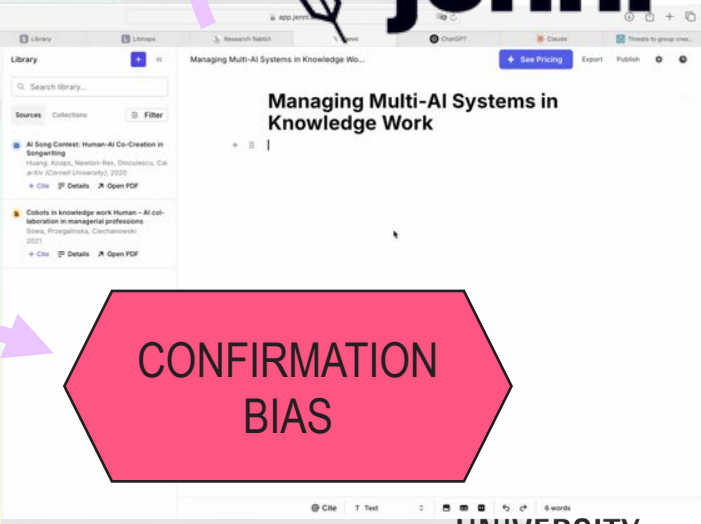

DOWNWARD NORM SETTING

CONFIRMATION BIAS

Leigh Thompson, & Leo F. Brajkovich. (2003). Improving the Creativity of Organizational Work Groups [and Executive Commentary]. *The Academy of Management Executive (1993-2005)*, *17*(1), 96–111.

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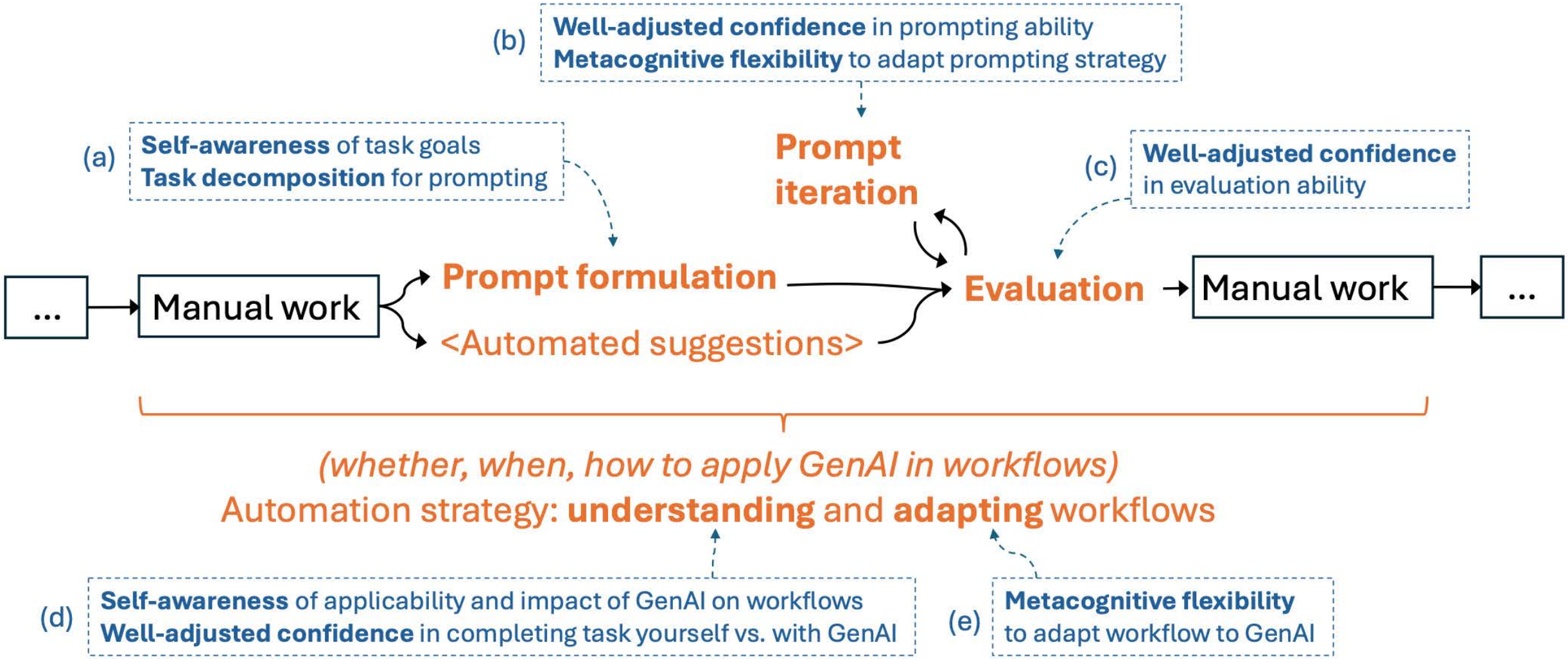
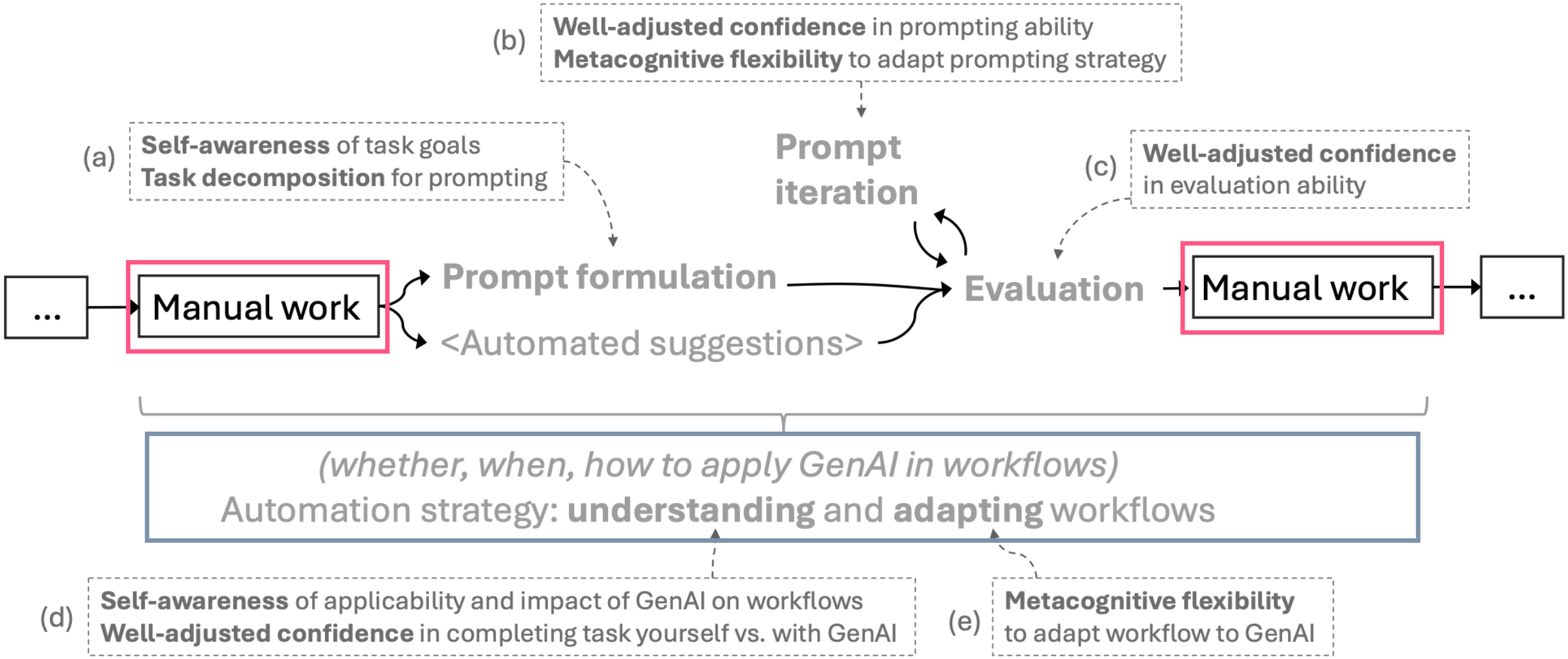
CHERISH THE BLANK SPACE.

PROTECT THIS ENVIRONMENT FIERCELY.



Tankelevitch, L., Kewenig, V., Simkute, A., Scott, A. E., Sarkar, A., Sellen, A., & Rintel, S. (2024, May). The metacognitive demands and opportunities of generative AI. In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems* (pp. 1-24).



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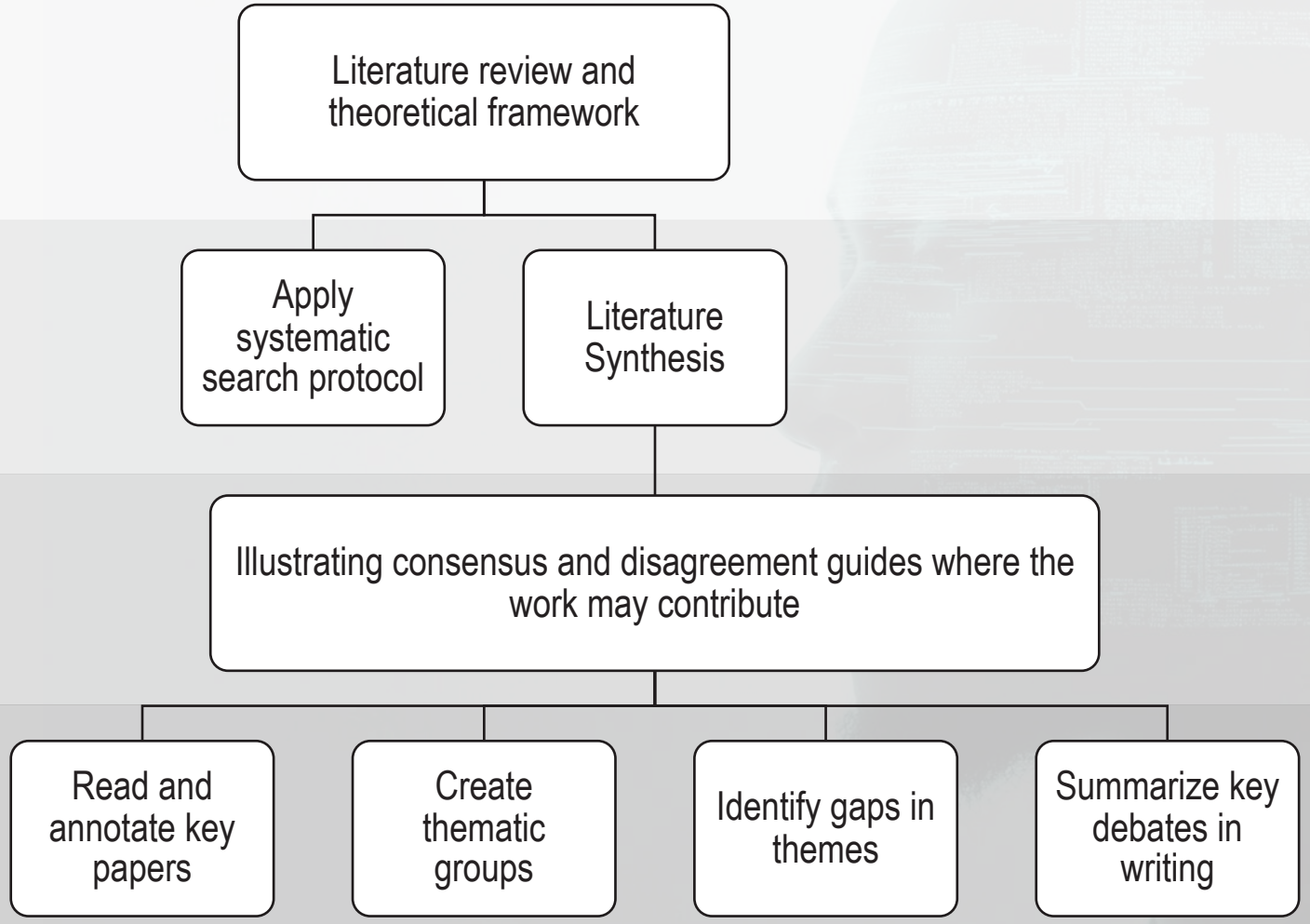
WORK/VALUE BREAKDOWN STRUCTURE

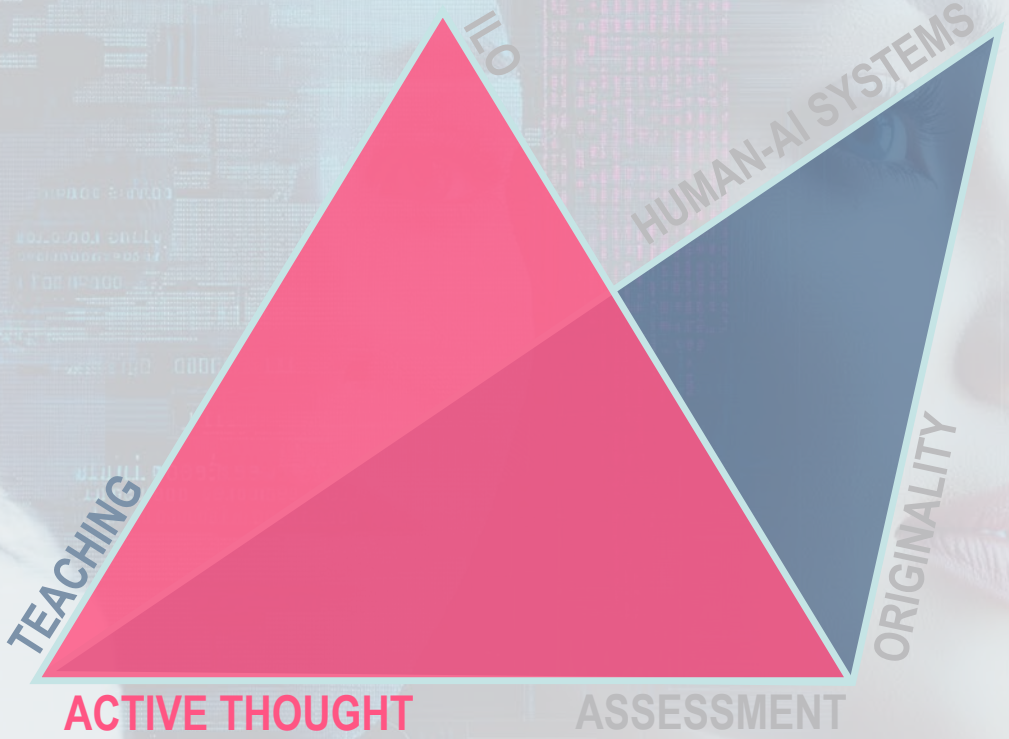
initiative

epic

story

task





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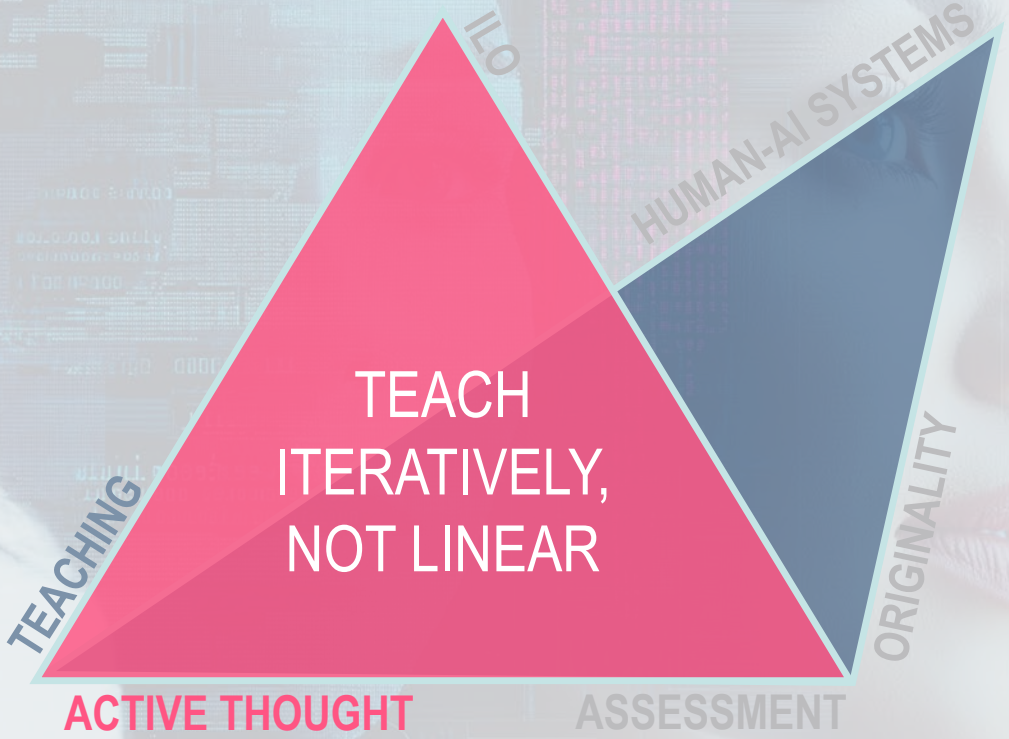

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Bloom's Taxonomy Revisited

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Version 2.0 (2024)

DOUBLE-BIND PROBLEM

- don't know how to use AI
- but to use AI well requires domain (expert)knowledge
- which novices don't have
- So: Human-AI ILOs need to be synced

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PRE

Beyond the buzz
Distinguish between current trends and tools around genAI
- Current developments in socio-technical AI
- AI literacy

Concepts of AI
Sketch the basic concepts of AI
- History of AI paradigms
- AI goes by many names
- Socio-technical and value-based AI

Responsible AI
Recognize the ethical implications and challenges associated with Gen AI

BASE

Preparing with the STEP-model
Segment tasks and defining roles for human-AI collaboration
- Segmenting tasks
- Transitioning roles
- Educating yourself
- Performance measures

AI assessment
Assess and select suitable AI models
- Assessing technology
- Assessing behavior (through play & comparison)
- Assessment criteria

MID

Prompting techniques
Design prompts and control context
- conversational / structured prompting
- zero-shot, few-shot, chain-of-thought prompting
- Retrieval augmented generation (RAG)

Modes of inquiry
Differentiate AI-based modes of inquiry
- Sparring
- Writing
- Coding
- Analyzing
- Visualizing

POST

Evaluation
Evaluate AI outputs based on responsible AI criteria

Communication
Formulate references with AI usage transparently

Reflection
Reflect on individual AI usage

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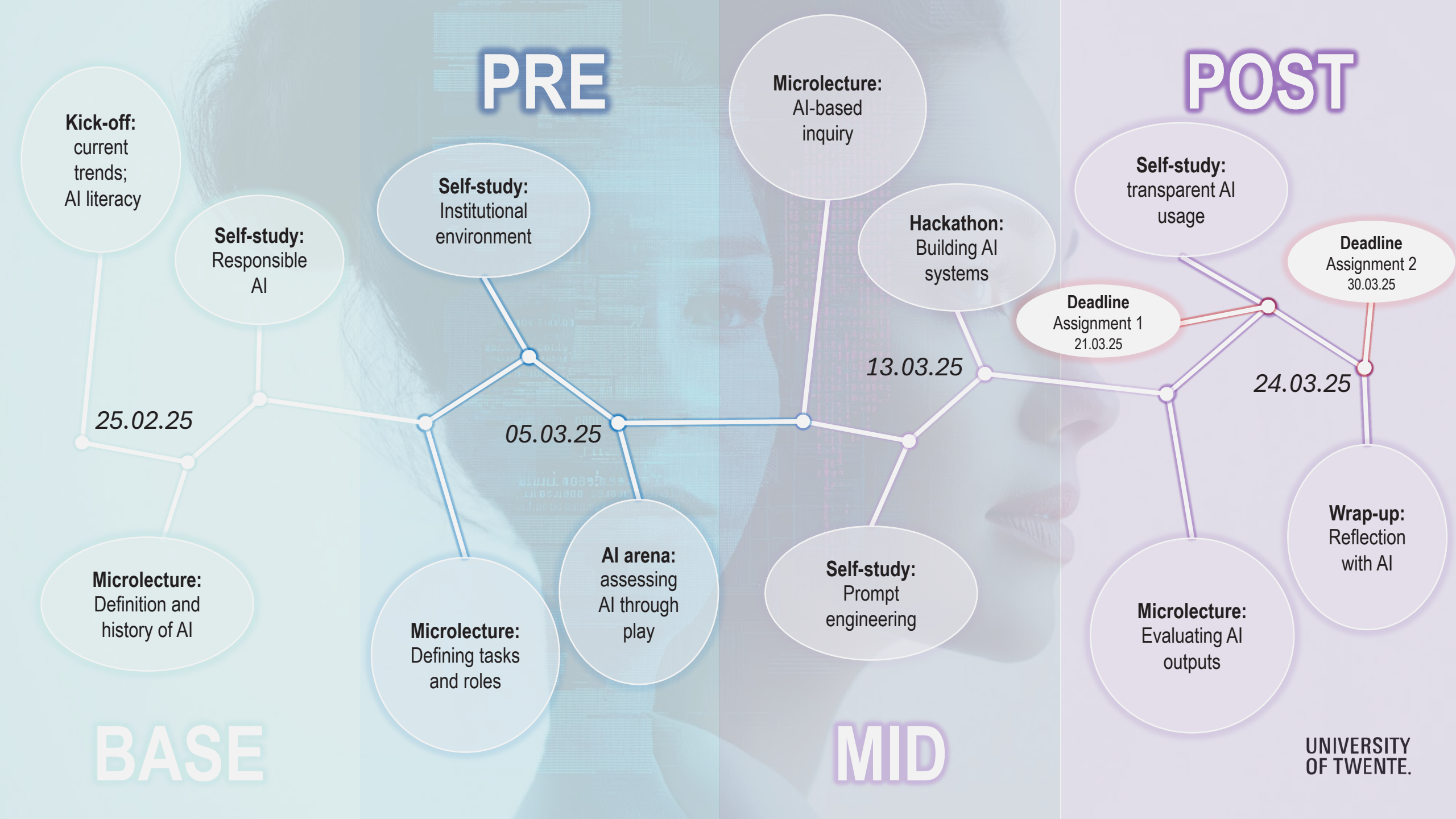
PRE
POST
Kick-off: current trends; AI literacy
Self-study: Responsible AI
Self-study: Institutional environment
Microlecture: AI-based inquiry
Hackathon: Building AI systems
Self-study: transparent AI usage
Deadline Assignment 2 30.03.25
Deadline Assignment 1 21.03.25
25.02.25
05.03.25
13.03.25
24.03.25
Microlecture: Definition and history of AI
Microlecture: Defining tasks and roles
AI arena: assessing AI through play
Self-study: Prompt engineering
Microlecture: Evaluating AI outputs
Wrap-up: Reflection with AI
BASE
MID
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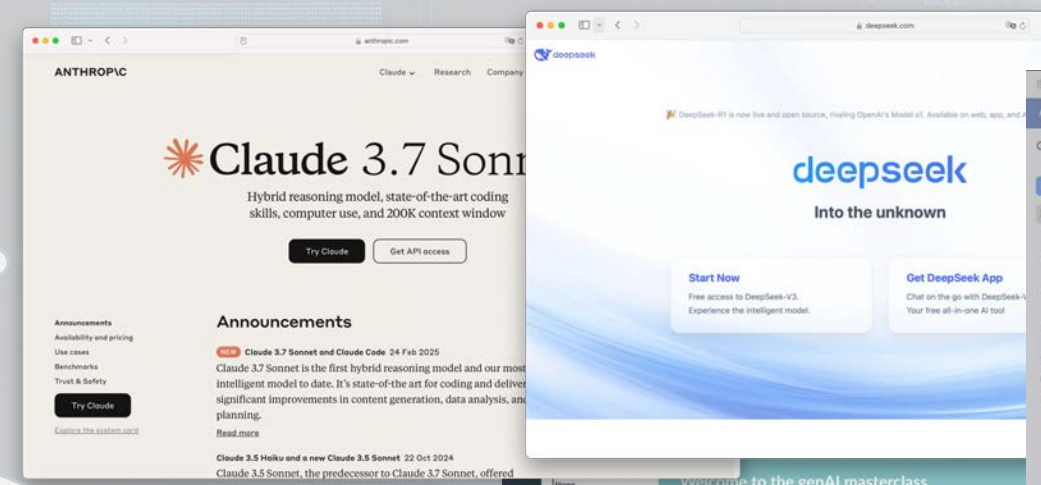
Kick-off:
current trends;
AI literacy

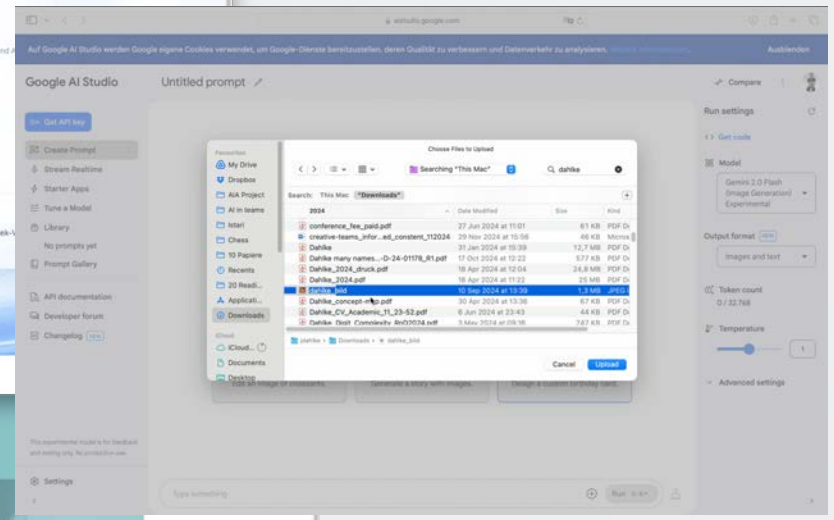
Self-study:
Responsible AI

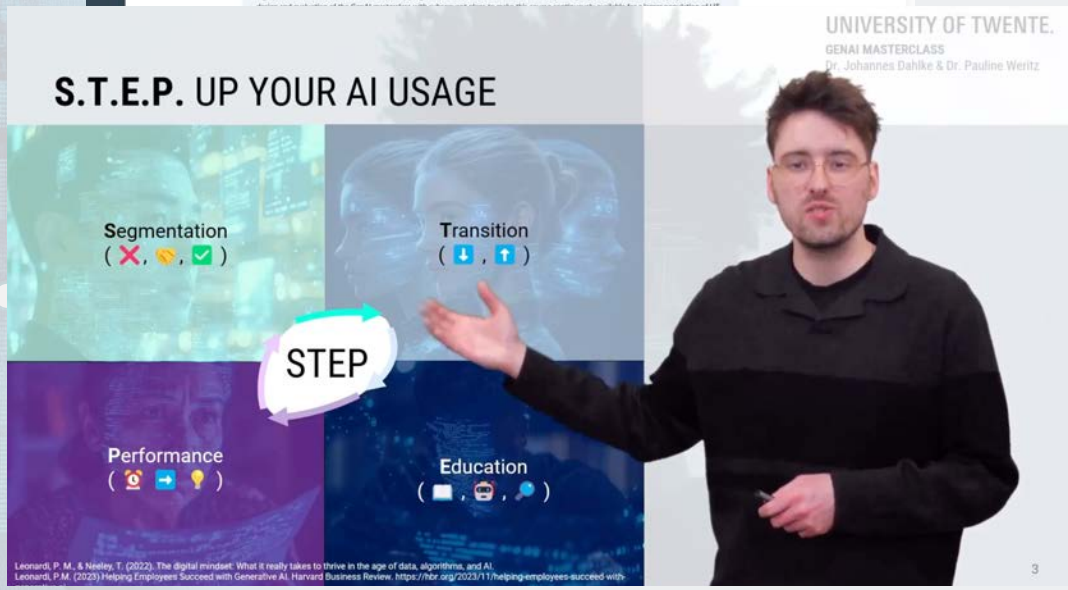
25.02.25

Microlecture:
Definition and history of AI

BASE







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WHAT IS THE NEXT ISSUE?

Oregon State University Ecampus

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Version 2.0 (2024)

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If AI is overused or used uncritically, the risk is that classrooms become depersonalized, focusing on efficiency and measurable outcomes but neglecting the deeper relational and transformative aspects of learning. This can negatively impact motivation, self-esteem, and personal development.

AI & Soc (2019) 34:47–54
DOI 10.1007/s00146-017-0693-8

CrossMark

ORIGINAL ARTICLE

AI and education: the importance of teacher and student relations

Alex Guilherme[1]

Received: 29 September 2015 / Accepted: 11 January 2017 / Published online: 4 February 2017

Abstract A defining aspect of our modern age is our tenacious belief in technology in all walks of life, not least in education. It could be argued that this infatuation with technology or 'techno-philia' in education has had a deep impact in the classroom changing the relationship between teacher and student, as well as between students; that is, these relations have become increasingly more I–It than I–Thou based because the capacity to form bonds, the level of connectedness between teacher and students, and between students has either decreased or become impaired by the increasing technologisation of education. Running parallel to this and perhaps exacerbating the problem is the so-called process of 'learnification', which understands that teachers are mere facilitators of the learning process, rather than someone with an expertise who has something to teach others. In this article, I first assess the current technologisation of education and the impact it has had in relations within the classroom; second, I characterise Buber's I–It and I–Thou relations and its implications for education; finally, I investigate through a thought experiment if the development of AI could 1 day successfully replace human teachers in the classroom.

Keywords Martin Buber · Teacher–student relations · Learnification · Techno-philia

1 Introduction: technologisation of education

The connection between technology and education is usually very complex and multifaceted because of the political, economic, social, and pedagogical implications that the use of technology has in education.[1] Generally speaking, it is understood that given that we live in 'technological societies', we must use technology to help with teaching and learning tasks, and learning about and using technologies must be an important part of the curriculum. This means that the development of technologies and programmes that fully support pedagogical ventures should become an imperative, because this will lead to general improvements in education. It is also understood that the technologisation of education will support students who often feel disadvantaged by the traditional educational system, improving their performances through access to computers and internet (Laura and Chapman 2009: 289). That said, it must be noted that there is another school of thought, "the Luddite, [which is] not open to innovation of even the most benign sort" (Kritt and Winegar 2007: 3), favouring the maintenance of traditional methodologies and approaches to education. These characterisations might seem generally unfair because they do not capture nuances, but they do demonstrate an ultimate difference in values (Kritt and Winegar 2007: 3) about the importance of technology for education.

✉ Alex Guilherme
alexandre.guilherme@pucrs.br

[1] Postgraduate Programme in Education, Pontifícia Universidade Católica do Rio Grande do Sul, PUCRS, Porto Alegre, Brazil

[1] For instance, the issue of 'technological inclusion' of individuals through education has deep social, political and economic effects, such as individuals being fit to join the labour market and contribute to the economic development of societies; likewise, 'technological exclusion' present us with serious social, political and economic problems, such as unemployment. In addition, the use of technology in education may change educational contexts, their geography, as well as the dynamics between individual.

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Version 2.0 (2024)

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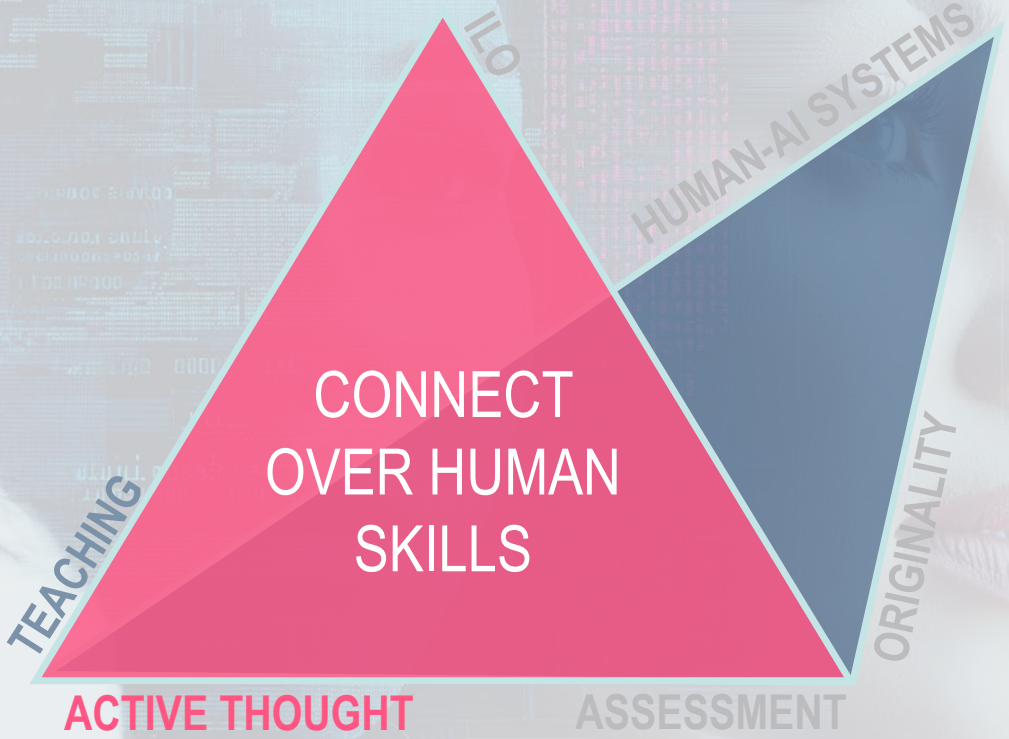

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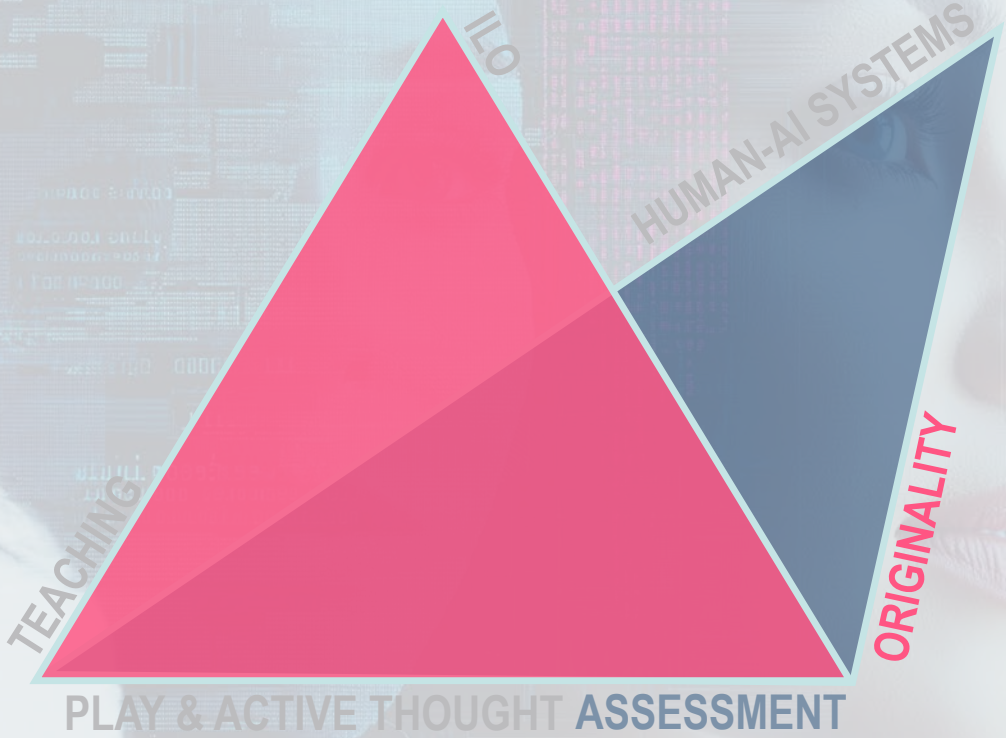

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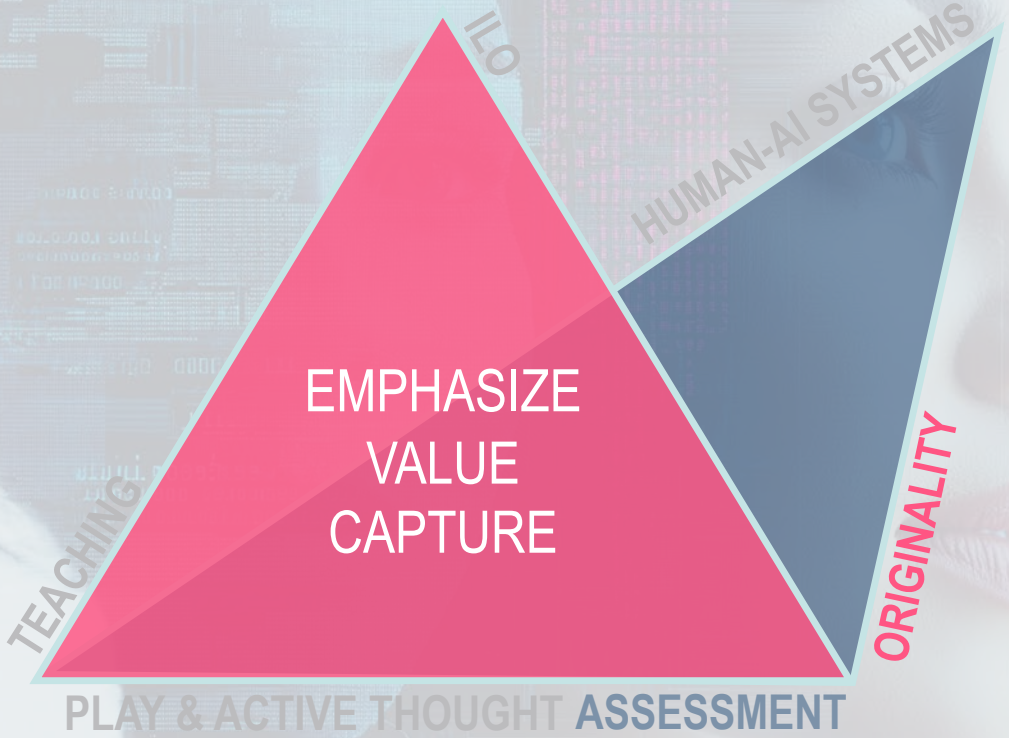

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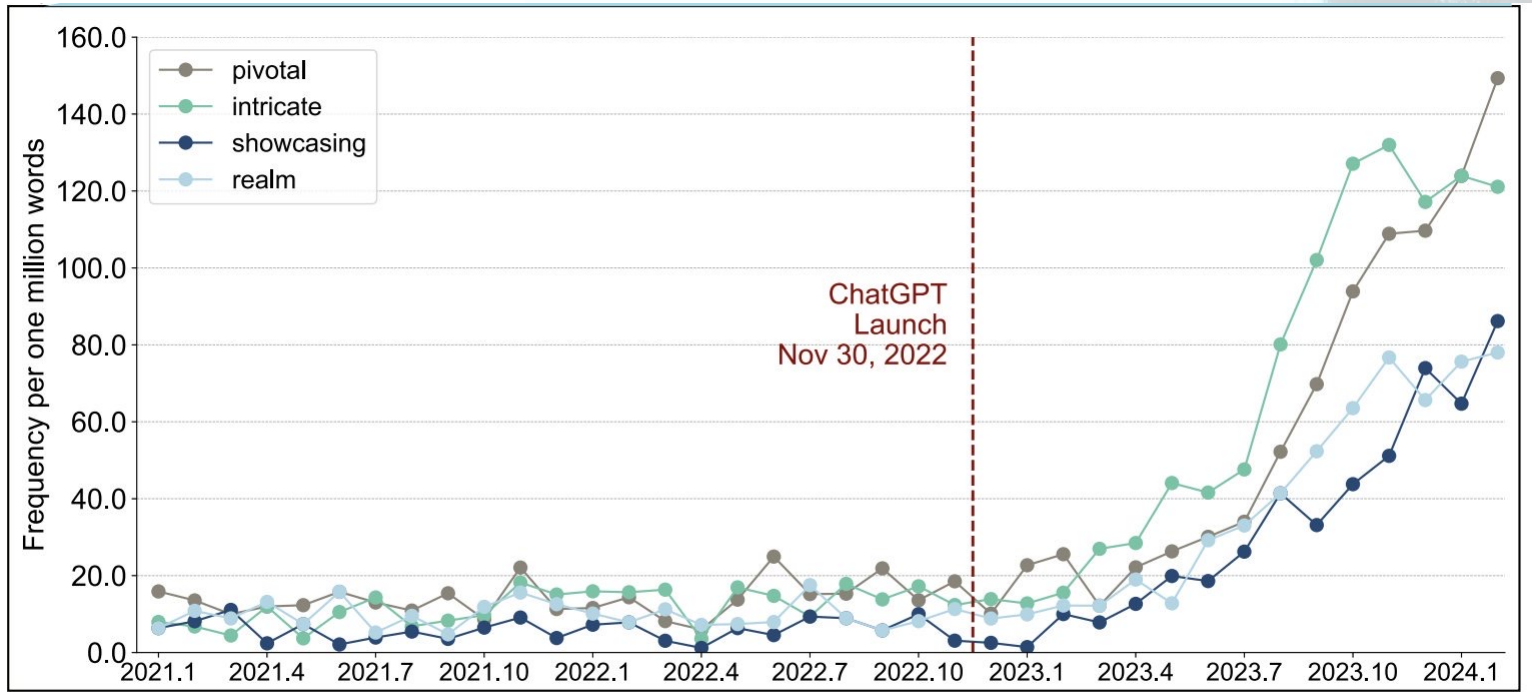
BEWARE OF AI GENERICISM



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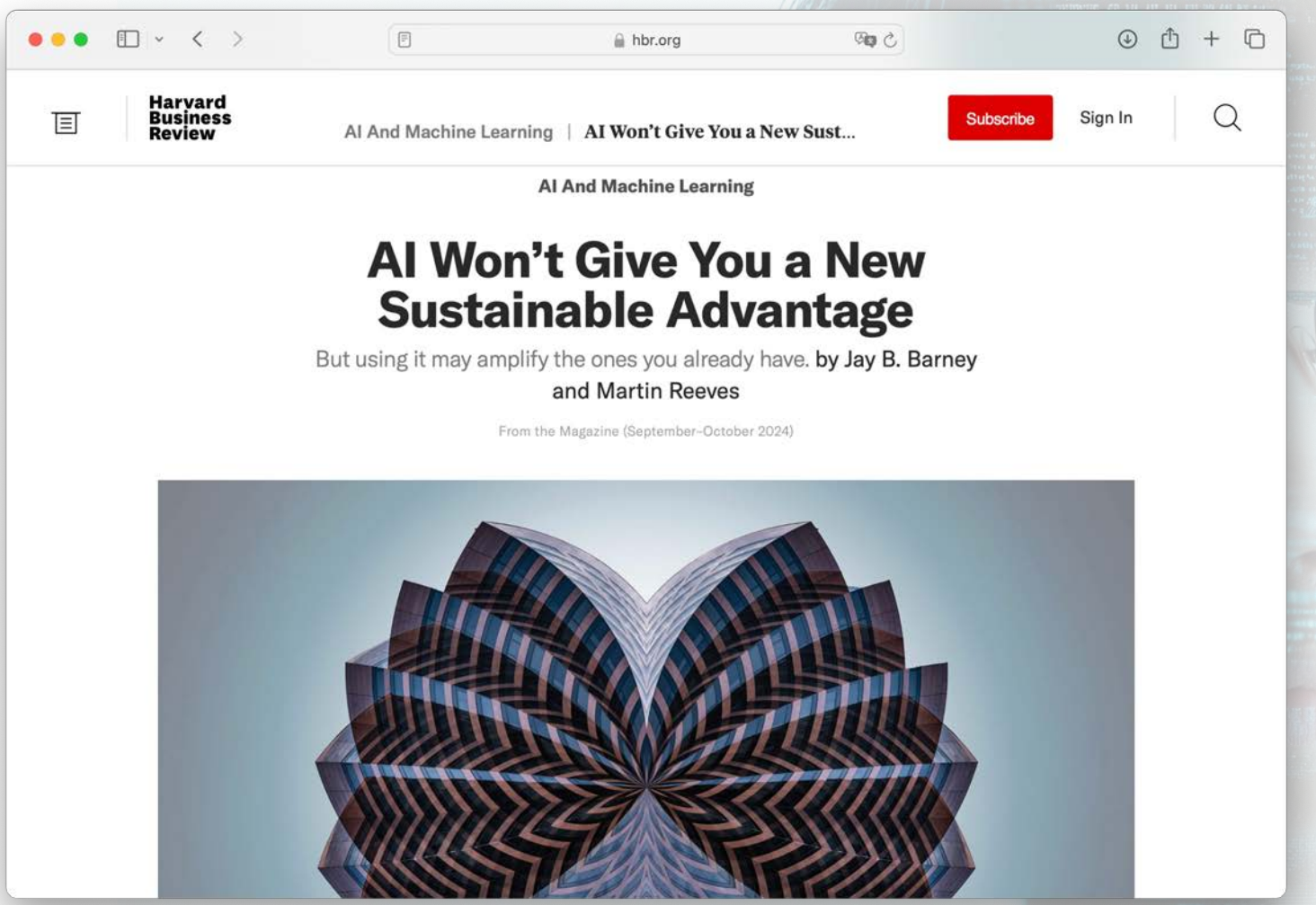
VALUE CREATION ≠ VALUE CAPTURE

- The widespread availability of AI tools levels the playing field, making it harder for people to distinguish themselves solely based on AI capability (Giuggioli & Pellegrini, 2023)
- ***AI is accessible to everyone****, thus making it difficult to gain an advantage by using it.*
- fast-evolving nature of AI erodes any competitive advantage as newer, more advanced tools become available (Jacobides et al., 2021; Kaggwa et al., 2023)
- *Novelty and advantages from using AI alone is* ***temporary at best****.*
- **As value creation gets easier, value capture becomes harder.**
- **Teaching must emphasize value capture (emphasizing complementarity & differentiation)**



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WHAT IS ORIGINALITY?

- Originality is the aspect of created or invented works that **distinguish them from reproductions, clones, forgeries, or substantially derivative works**.

- Original is what is functional for scientific progress, and thus typically rewarded within the scientific community (Gützkow et al., 2004)

BORING

ABSURD

confirming

INTERESTING

rejecting

Davis, Murray S., *That's Interesting: Towards a Phenomenology of Sociology and a*

Phil. Soc. Sci. 1 (1971), 309–344 *Printed in Great Britain* 309

That's Interesting!

Towards a Phenomenology of Sociology and a Sociology of Phenomenology

MURRAY S. DAVIS

SUMMARY

QUESTION: How do theories which are generally considered *interesting* differ from theories which are generally considered *non-interesting*? ANSWER: Interesting theories are those which *deny* certain assumptions of their audience, while non-interesting theories are those which *affirm* certain assumptions of their audience. This answer was arrived at through the examination of a number of famous social, and especially sociological, theories. That examination also generated a systematic index of the variety of propositional forms which interesting and non-interesting theories may take. The fertility of this approach suggested a new field be established called the *Sociology of the Interesting*, which is intended to supplement the Sociology of Knowledge. This new field will be *phenomenologically* oriented in so far as it will focus on the movement of the audience's mind from one accepted theory to another. It will be *sociologically* oriented in so far as it will focus on the dissimilar base-line theories of the various sociological categories which compose the audience. In addition to its value in interpreting the social impact of theories, the Sociology of the Interesting can contribute to our understanding of both the common sense and scientific perspectives on reality.

PART I: INTRODUCTION

It has long been thought that a theorist is considered great because his theories are true, but this is false. A theorist is considered great, not because his theories are true, but because they are *interesting*. Those who carefully and exhaustively verify trivial theories are soon forgotten; whereas those who cursorily and expediently verify interesting theories are long remembered. In fact, the truth of a theory has very little to do with its impact, for a theory can continue to be found interesting even though its truth is disputed—even refuted!

Since this capacity to stimulate interest is a necessary if not sufficient characteristic of greatness, then any study of theorists who are considered great must begin by examining why their theories are considered interesting—why, in other words, the theorist is worth studying at all. But before we can attempt even this preliminary task we must understand clearly why some theories are considered interesting while others are not. In this essay, I will

"The first criterion by which people judge anything they encounter, even before deciding whether it is true or false, is whether it is interesting or boring."

Murray Davis (1999: 245)

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BORING

ABSURD

confirming

INTERESTING

rejecting

SIMPLE PROMPT

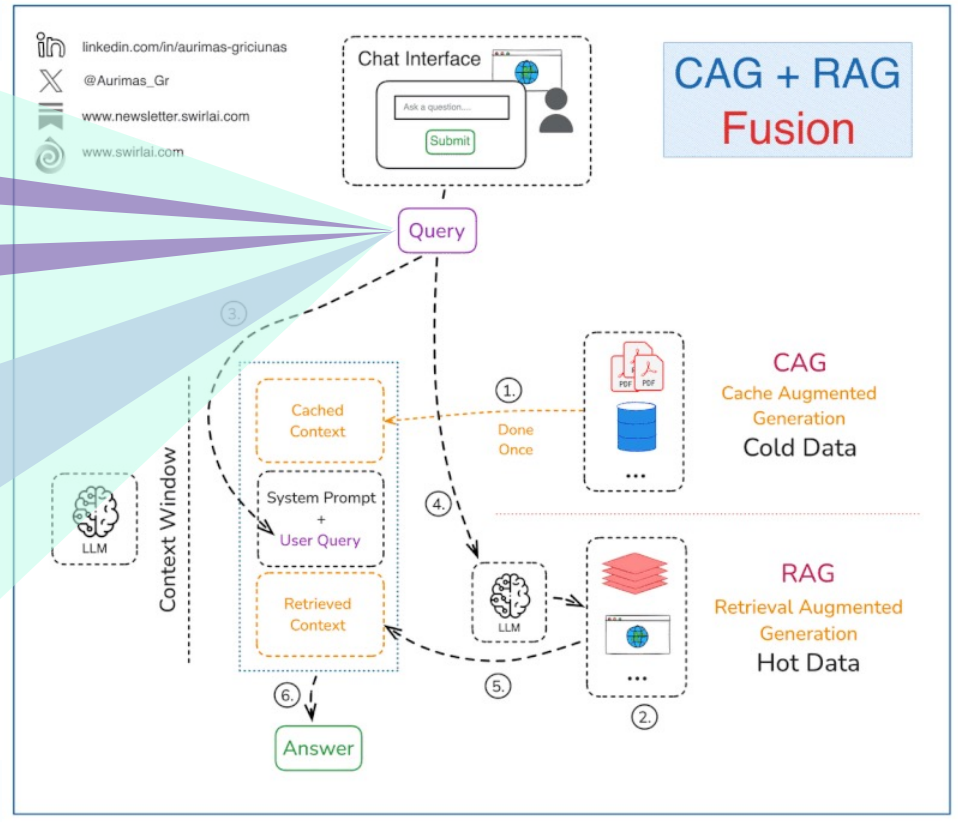
Chat & chatter

GPT "AGENT"

Facts & findings

STRUCTURED PROMPT

Code & math



large language models work by predicting the next word, or part of a word (token), that would come after your prompt:

The best thing about AI is its ability to

learn	4.5%
predict	3.5%
make	3.2%
understand	3.1%
do	2.9%

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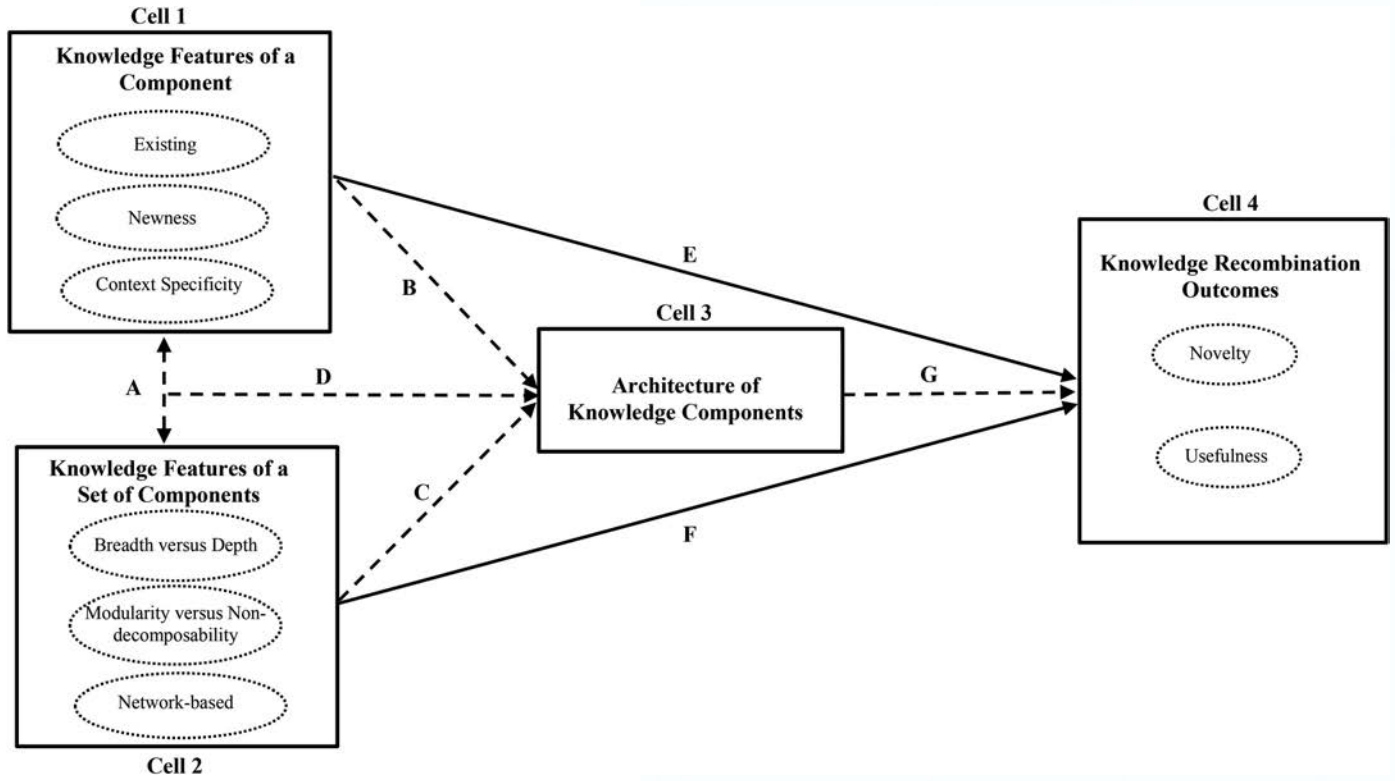

Xiao, T., Makhija, M., & Karim, S. (2021). A Knowledge Recombination Perspective of Innovation: Review and New Research Directions. Journal of Management, 48(6), 1724-1777. https://doi.org/10.1177/01492063211055982

- Schumpeter (1939: 88) argues that "innovation combines components in a new way, or that it consists in carrying out new combinations"
- Ferguson (2015) argues, it all comes down to the three fundamental principles of remix:
  1. Copy
  2. Transform
  3. Combine

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Bloom's Taxonomy Revisited

Use this table as a reference for evaluating and considering changes to aligned course activities (or, where possible, learning outcomes) that emphasize distinctive human skills and/or integrate generative AI (GenAI) tools as a supplement to the learning process.

All course activities and assessments will benefit from ongoing review given the evolving capabilities of GenAI tools.

	Distinctive Human Skills	How GenAI Can Supplement Learning*	
CREATE	Engage in both creative and cognitive processes that leverage human lived experiences, social-emotional interactions, intuition, reflection, and judgment to formulate original solutions	Support brainstorming processes; suggest a range of alternatives; enumerate potential drawbacks and advantages; describe successful real-world cases; create a tangible deliverable based on human inputs	RECOMBINE
EVALUATE	Engage in metacognitive reflection; holistically appraise ethical consequences of other courses of action; identify significance or situate within a full historical or disciplinary context	Identify pros and cons of various courses of action; develop and check against evaluation rubrics	
ANALYZE	Critically think and reason within the cognitive and affective domains; justify analysis in depth and with clarity	Compare and contrast data, infer trends and themes in a narrowly-defined context; compute; predict; interpret and relate to real-world problems, decisions, and choices	TRANSFORM
APPLY	Operate, implement, conduct, execute, experiment, and test in the real world; apply human creativity and imagination to idea and solution development	Make use of a process, model, or method to solve a quantitative or qualitative inquiry; assist students in determining where they went wrong while solving a problem	
UNDERSTAND	Contextualize answers within emotional, moral, or ethical considerations; select relevant information; explain significance	Accurately describe a concept in different words; recognize a related example; translate to another language	COPY
REMEMBER	Recall information in situations where technology is not readily accessible	Retrieve factual information; list possible answers; define a term; construct a basic chronology or timeline	

*AI capabilities derived with reference to an analysis of the MAGE framework, based on ChatGPT 4 as of October 2023. See Zaphir, L., Lodge, J. M., Lisec, J., McGrath, D., & Khosravi, H. (2024). How critically can an AI think? A framework for evaluating the quality of thinking of generative artificial intelligence. arXiv preprint arXiv:2406.14769.

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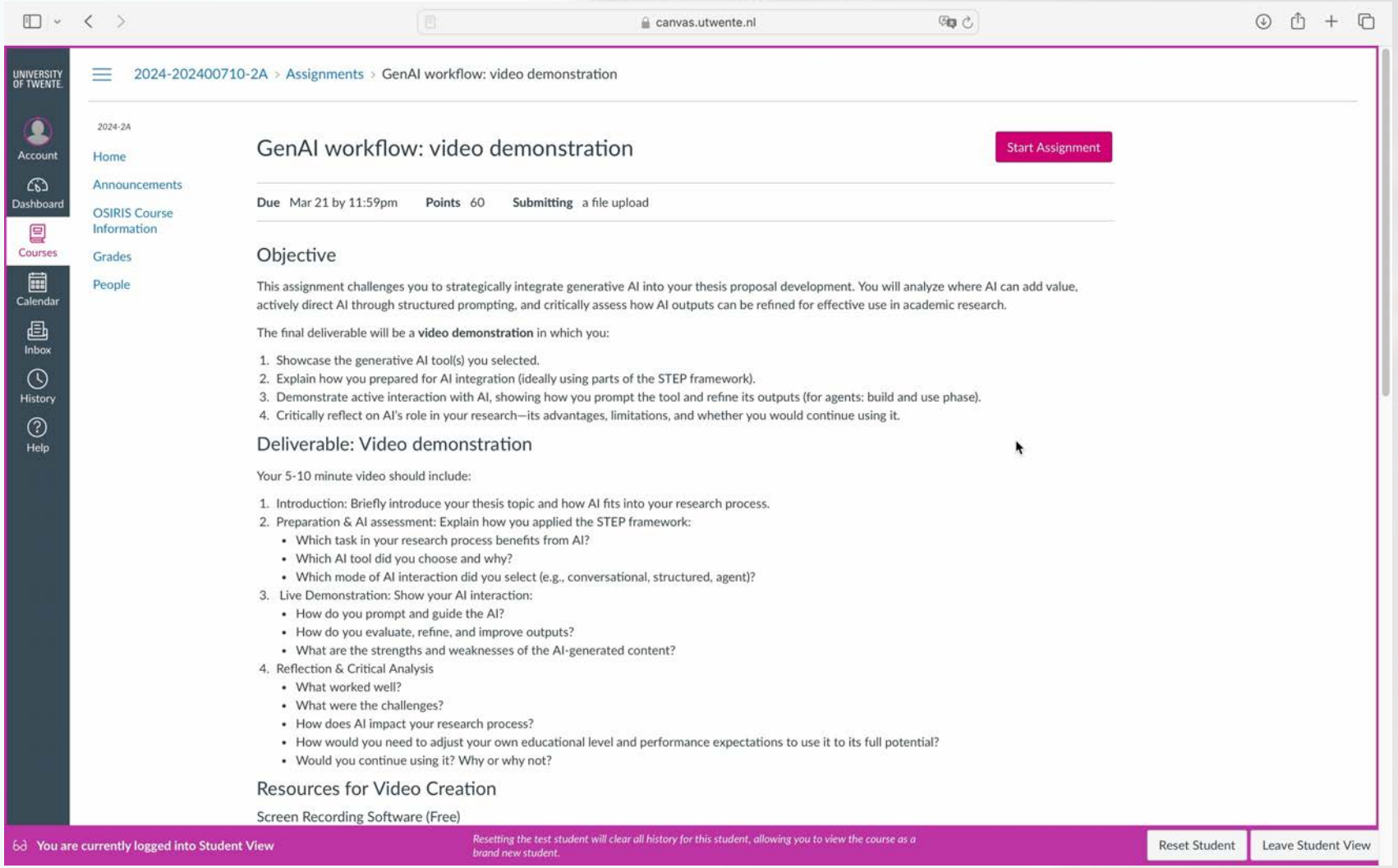
ASSIGNMENT 1: VIDEO DEMO YOUR GEN AI WORKFLOW



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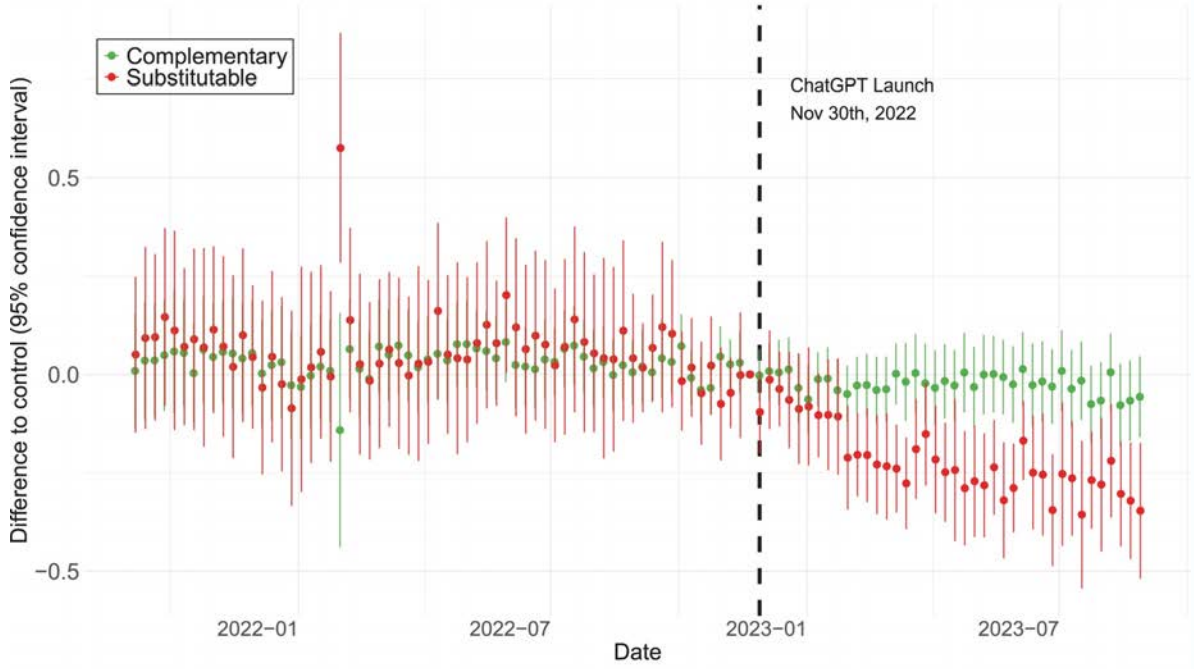

(b) Estimated demand shock in the substitutable and complementary group around the introduction of ChatGPT in November 2022

Teutloff, O., Einsiedler, J., Kässi, O., Braesemann, F., Mishkin, P., & del Rio-Chanona, R. M. (2025). Winners and losers of generative AI: Early Evidence of Shifts in Freelancer Demand. Journal of Economic Behavior & Organization, 106845.

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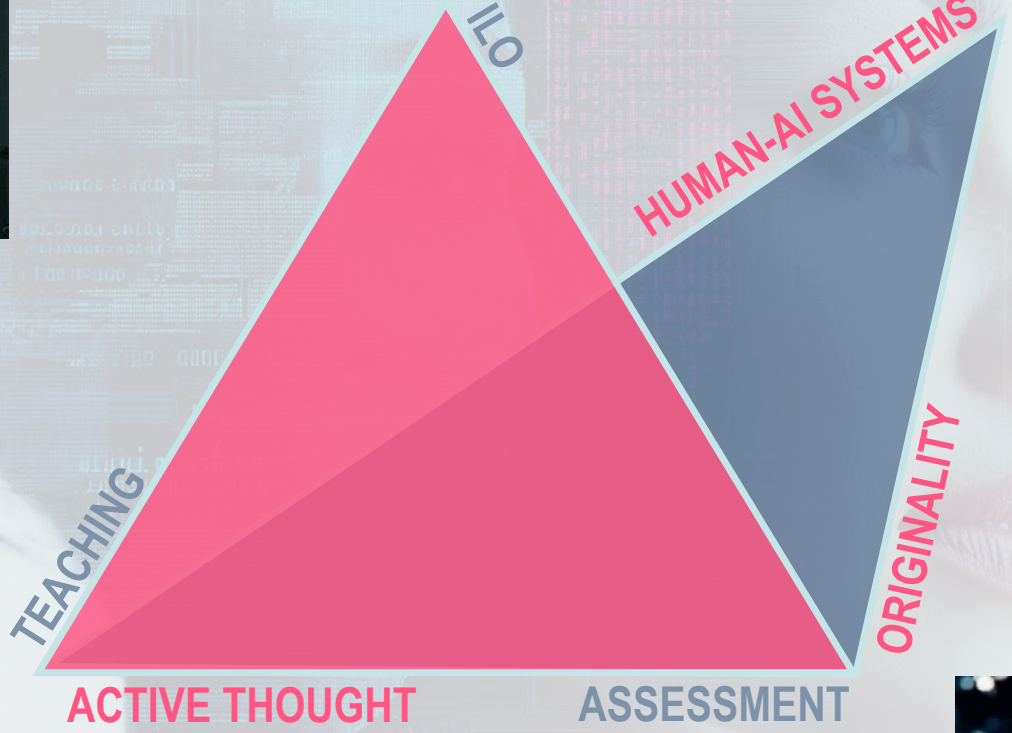

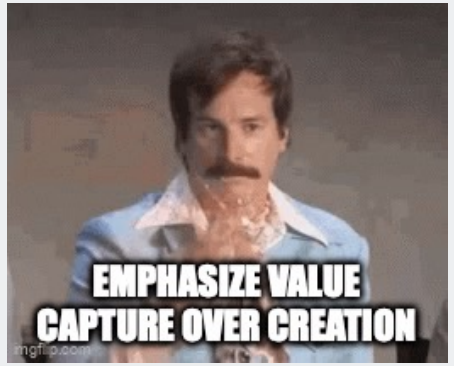

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THANK YOU

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