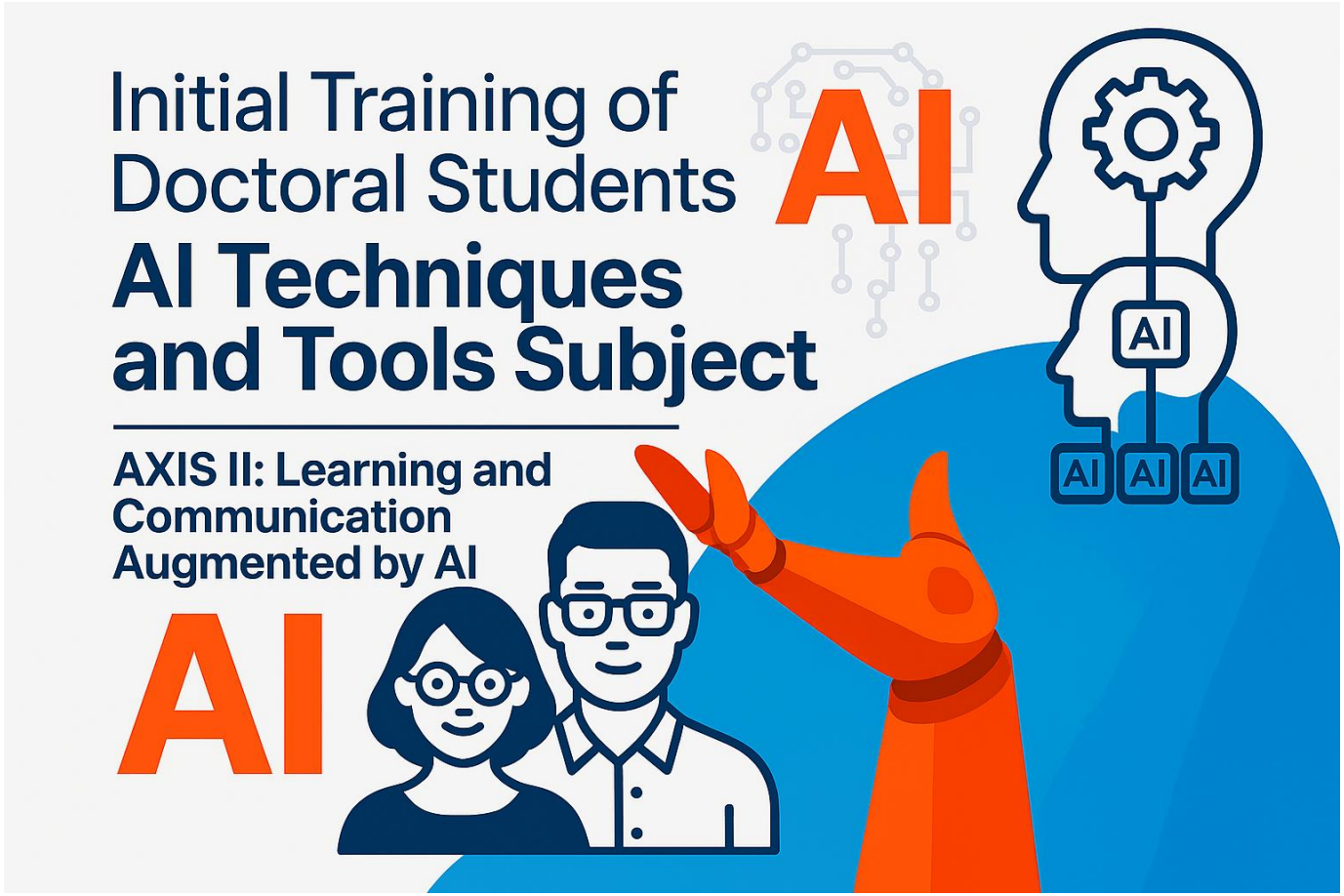
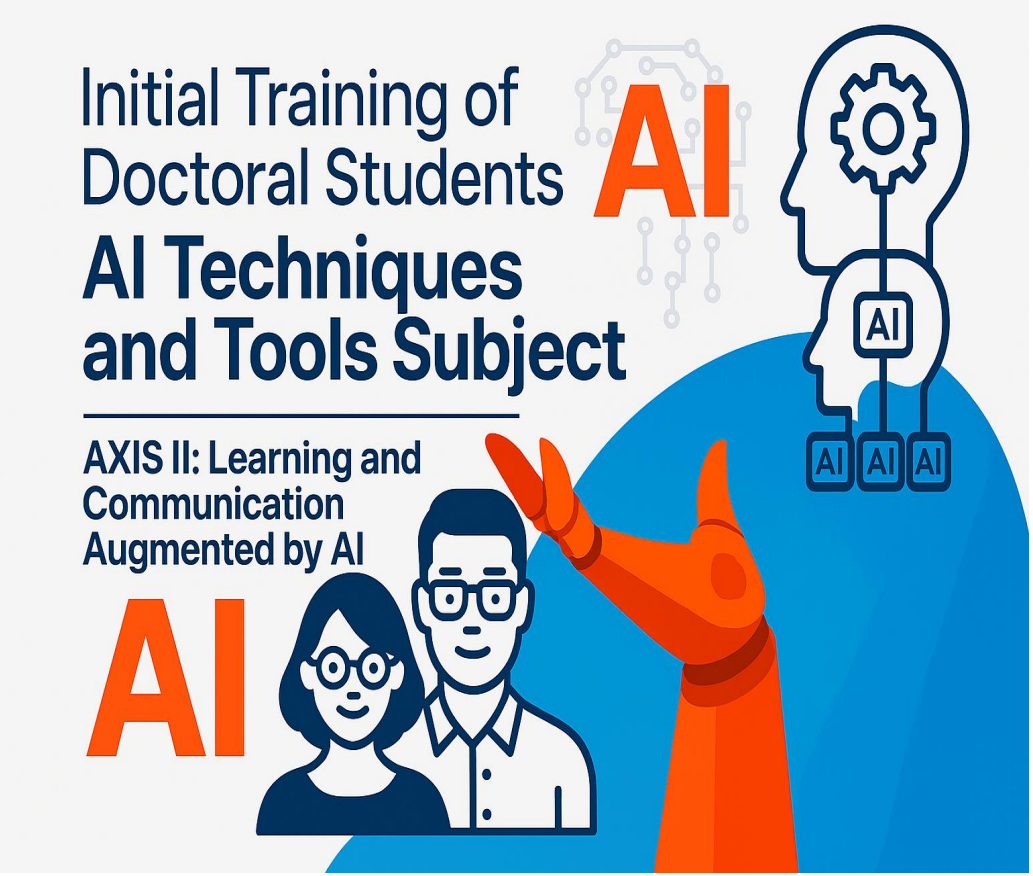
الجمهورية الجزائرية الديمقراطية الشعبية
Algerian Democratic Republic and Populaire
وزارة التعليم العالي و البحث العلمي
Ministry of Higher Education and Scientific Research

اللجنة الوطنية للاشراف ومتابعة تنفيذ برنامج تدعيم التكوين الأولي
في الطورالثالث في مؤسسات التعليم العالي- 2025-



Axis II : Learning and Communication Augmented by AI - Overview 1/2 -



- Axis 2 of the module "**Techniques and Tools of Artificial Intelligence**" focused on a central theme for any researcher:

  "Learning and Communication augmented by AI."

- This axis is designed specifically for PhD students in the Humanities and Social Sciences (SSH) and Science and Technology (S&T) branches —to help them better leverage artificial intelligence tools in their research and writing practices.

Axis II : Learning and Communication Augmented by AI - Overview 2/2 -

Two main objectives

- Integrate AI as a tool to support learning and scientific communication.
- Develop a critical mastery of tools for writing and literature review.

Demystify AI

1. **Definition and history of AI**
   What is AI?

2H

AI as Tool,

2. **Generative AI and prompt engineering**

3. **AI-Assisted Scientific Writing**

2H

4. **AI-Assisted Literature Review and Critical Analysis**

2H

Workshop

5. **AI Tools at the Service of the Researcher**

2H

Demystify AI

1

Definition and history of AI
What is AI?

Introduces the definition and evolution of AI by employing a metaphorical framework in which the major paradigms of AI are illustrated through the structured advancement of culinary expertise.

Meriem's Culinary Journey

Demystify AI

1 Definition and history of AI
What is AI?

Understanding the Evolution of Artificial Intelligence through the Lens of Gastronomy

A conceptual metaphor to explore symbolic, connectionist, generative, and hybrid AI models.

Meriem’s Kitchen as a Cognitive Framework

Demystify AI

1 Definition and history of AI
What is AI?

- *Meriem, our passionate guide.*

- *Cooking as a universal metaphor: Learning, rules, adaptation, creativity, complexity.*

➔ Objective: Follow Meriem to demystify the evolution of AI.

The Age of Rules – Symbolic AI

Demystify AI

1 Definition and history of AI
What is AI?

- ***Note**: Meriem follows recipes to the letter (3 eggs, 200g sugar…).*

- ***Related AI Concept:** Symbolic Artificial Intelligence.*
  - *Based on explicit logical rules.*
  - *Knowledge defined by experts (think "grandmother's recipe").*
  - *Works well within a defined framework.*

Cooking by the Book

➔ Limitation: Fragile when faced with the unexpected (missing ingredient, different oven) → Failure!

The Age of Rules – Symbolic AI

Demystify AI

1 Definition and history of AI
What is AI?

Symbolic AI:

In the beginning, Meriem follows a recipe step-by-step, which represents “Expert Systems.” She never changes anything. As illustrated by the following Java pseudo-code

```
rule "Prepare the batter"
when
  Ingredient(name == "flour", present == true)
  Ingredient(name == "eggs", present == true)
  Ingredient(name == "sugar", present == true)
  Ingredient(name == "butter", present == true)
then
    insert(new Step("Mix the dry and wet ingredients to form the
batter"));
end
```

Symbolic cooking AI

➡ This is like symbolic AI: it works with rules written by humans. It’s pure logic.

✔ Reliable for well-defined problems,

✘ But rigid: when the context changes, it fails. In our context, it is rigid: - such as when an ingredient is missing, it fails, requiring experimentation to develop a new recipe.)

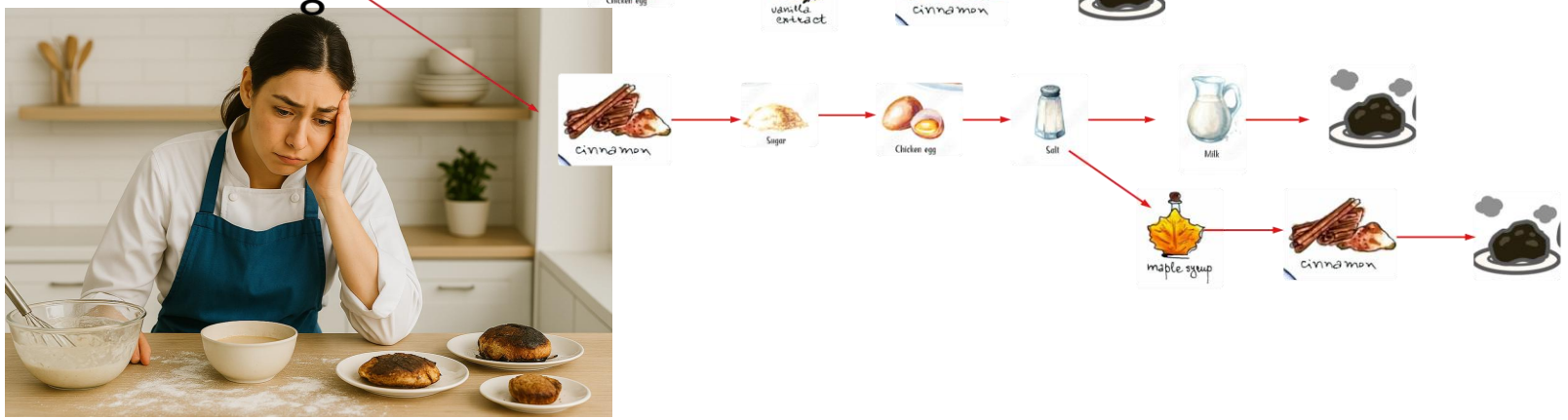
Trials, Errors, and Complex Rules

Demystify AI

1 Definition and history of AI
What is AI?

Early AI Pitfalls: Randomness and Rule Explosion

- *Meriem experiments randomly—wasting resources and only occasionally succeeding by chance.*
- ***Related AI Concept:*** *Early forms of Reinforcement Learning (simple trial and error), but ineffective in this context.*
- *She tries to create ultra-complex rules (IF… THEN… UNLESS…).*



Rule Exhaustion: The Wall of Complexity

➔ Limitation: Unmanageable complexity; the system is always incomplete.

Trials, Errors, and Complex Rules

Demystify AI

1 Definition and history of AI
What is AI?

Early AI Pitfalls: Randomness and Rule Explosion

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Rule Exhaustion: The Wall of Complexity

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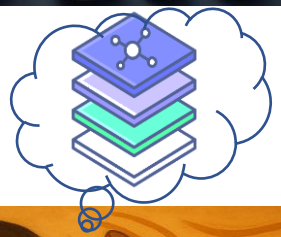
The Breakthrough – Learning from Experience (Connectionist AI 1/2)

Demystify AI

1 Definition and history of AI
What is AI?

- *Grand mother Fatima's advice: "**The secret is in ALL experiences**."*
- *Meriem changes her approach by **massively collecting** culinary **data**:*
  - *Recipes, videos, tastings, reviews, analyzed mistakes…*



dataset

- ***Related AI Concept:** Connectionist Artificial Intelligence / Machine Learning.*
  - *Learning from large amounts of data (Meriem's **dataset**).*
  - *Not based on explicit rules, but on discovered patterns.*

➔ Progress: We're making headway.

The Breakthrough – Learning from Experience (Connectionist AI 2/2)

Demystify AI

1 Definition and history of AI
What is AI?

Struggles with Complexity and Randomness

- *Meriem continues to analyze dozens of recipes and ingredients in order to establish her own decision rules.*
- *The principle of decision trees or statistical models in machine learning.*

➔ The volume of data becomes too large, the model explodes in complexity and becomes difficult to manage, even unusable.

Emerging Intuition – Deep Learning

Demystify AI

1 Definition and history of AI
What is AI?

- *Meriem creates a completely new dish for a demanding customer.*
- *She doesn't replicate; she **generates** based on her deep knowledge.*

- **Related AI Concept:** *Deep Learning (a subfield of Connectionism)*
  - *Meriem's brain, like a neural network, detects subtle patterns in the data.*
  - ***Layer Analogy:***
    - *Simple layers: Recognizing a cooking color or smell.*
    - *Deep layers: Understanding flavor balance and the ideal texture.*
- *This approach enables adaptation and prediction in the face of novelty.*

➔Arrival: We've reached a turning point.

Inventing the New – Generative AI

Demystify AI

1 Definition and history of AI
What is AI?

- *Meriem develops a "feeling," an intuition—she knows how to adjust.*

- ***Related AI Concept:*** *Generative Artificial Intelligence.*
  - *Producing original content (text, image, music, recipe…).*
  - *Relying on learned patterns to craft new, coherent combinations.*

- *Examples: ChatGPT, Midjourney… and Meriem!*

➔ Pushing beyond limits: We strive for excellence.

The Accomplished Chef – Hybrid AI

- *Meriem now combines:*
  - *Basic rules (safety, hygiene – Symbolic).*
  - *Her deep intuition (data patterns – Connectionist).*
  - *Her creativity (new content generation – Generative).*

- ***Related AI Concept:*** *Hybrid Artificial Intelligence.*
  - *Synergy of approaches for greater robustness and flexibility.*
  - *The best of both worlds: Reliable rules + adaptation + creativity.*

➔ We achieve excellence.

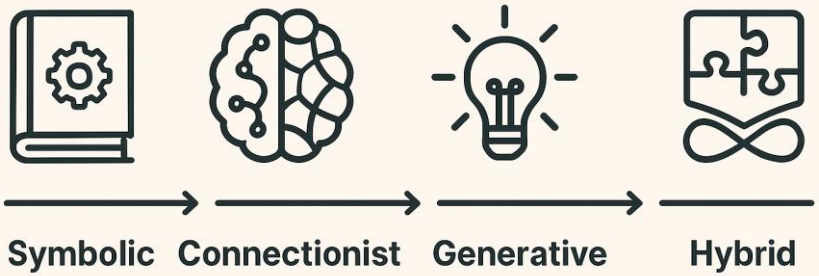
The Timeline of IA (1/2)

Demystify AI

1 Definition and history of AI
What is AI?

Artificial Intelligence (AI): is a set of technologies that allow a machine to simulate human abilities: understanding, learning, reasoning, creating… It can be simple or very complex, depending on the approach

1. Symbolic : Strict rules (recipe) → Fragile.
2. Connectionist / Deep Learning: Learning from data (massive experience) → Intuition, adaptation.
3. Generative : Creating novel content (invention) → Innovation
4. Hybrid : Combining strengths (mastery) → Robustness, flexibility.



Recap (1/5)

Demystify AI

1 Definition and history of AI
What is AI?

Symbolic AI

- ➡ It works with rules written by humans. It's pure logic.
- ✔ Reliable for well-defined problems,
- ✘ Rigid: When the context changes, it fails.

Demystify AI

1 Definition and history of AI
What is AI?

Connectionist AI

➡ Learns from data. But here, we can split it into two approaches:

❑ Machine Learning (ML):

📌 Decision trees or statistical models.

✔ Often interpretable,

✘ When the data grows, the model can explode and become unmanageable.

❑ Deep Learning (DL):

✔ Powerful for tasks like image or speech recognition,

✘ Needs a lot of data and computing power, Lacks transparency: we often don't know why the AI made a certain decision.

Recap (3/5)

Demystify AI

1 Definition and history of AI
What is AI?

Generative AI

- ➔ Produces text, images, music…
- ✔ Highly innovative,
- ✘ Hard to control: It can generate illogical or incorrect content.

Hybrid AI

- ➜ Blends the best of all previous types.
- ✔ Robust and powerful,
- ✘ Very complex to design and maintain.

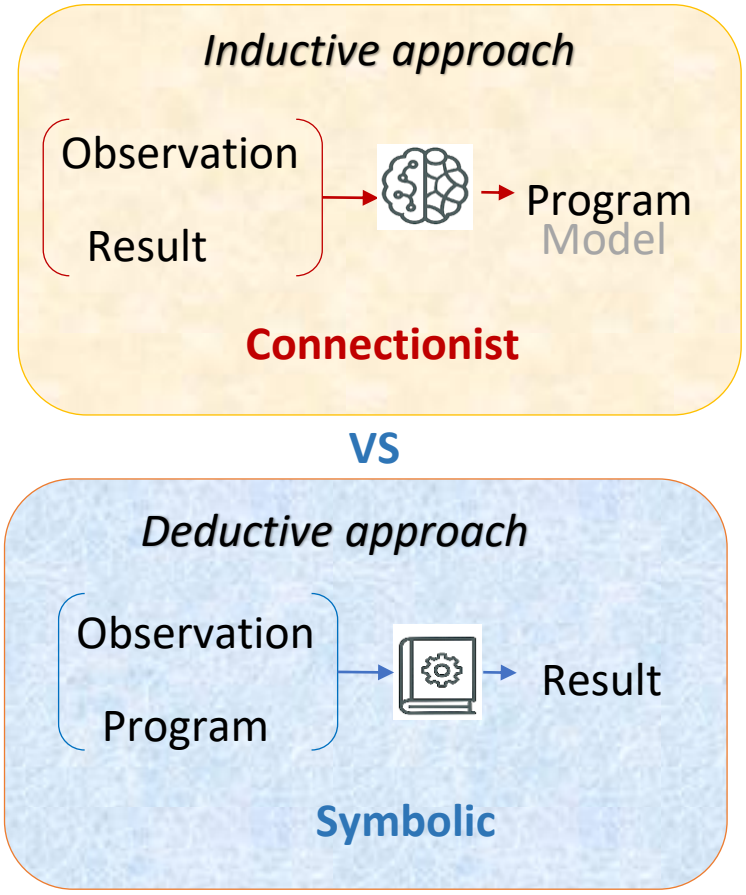
Conclusion

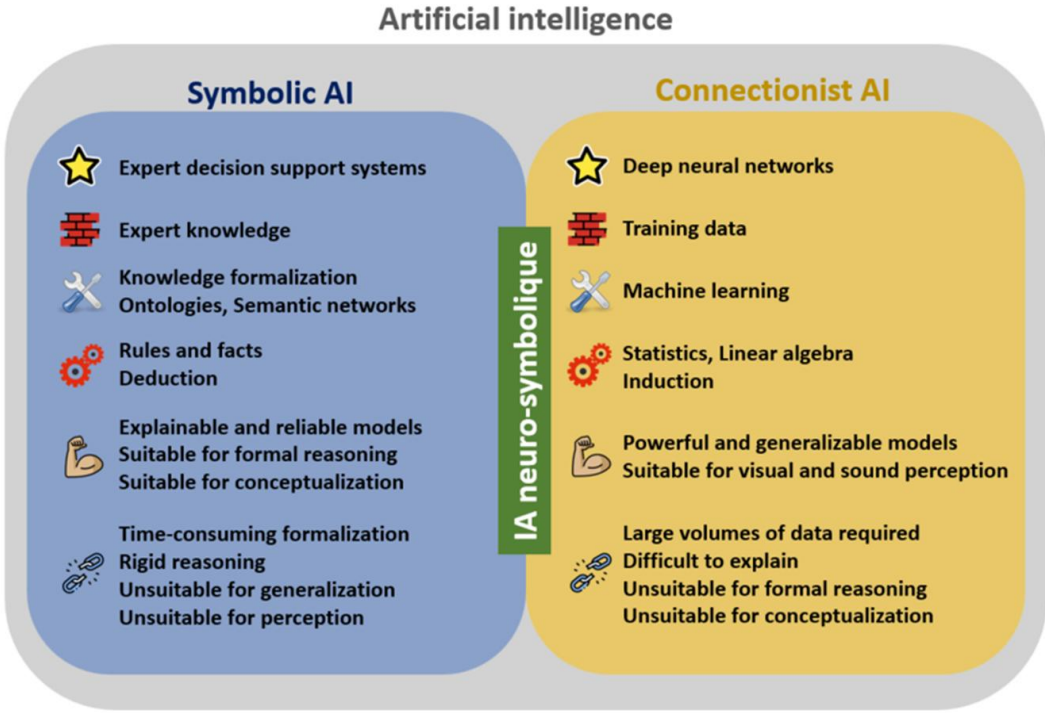
The evolution of AI mirrors Meriem's learning journey in the kitchen. She starts with rigid logic, learns to adapt, becomes creative… and eventually masters it all. Today, the real challenge is to build hybrid AI: as logical as an expert, as adaptable as a learner, and as creative as an artist."

The Timeline of IA (2/2)

Demystify AI

1 Definition and history of AI
What is AI?





A comparison of the symbolic and connectionist trends in artificial intelligence. The neuro-symbolic approach lies at the intersection of these two trends

The Journey of AI, Like Meriem (Continued)

Demystify AI

1 Definition and history of AI
What is AI?

1. AI is an extraordinarily powerful tool.

2. Yet, it still needs us for:
   I. Context: Culture, human relationships.
   II. Ethics: Responsible choices and values.
   III. Meaning and Intention: Understanding the "why."

AI amplifies our potential—but we remain the decision-makers.