

ReasoningLayer: a neuro-symbolic platform for auditable, hallucination-free AI in healthcare



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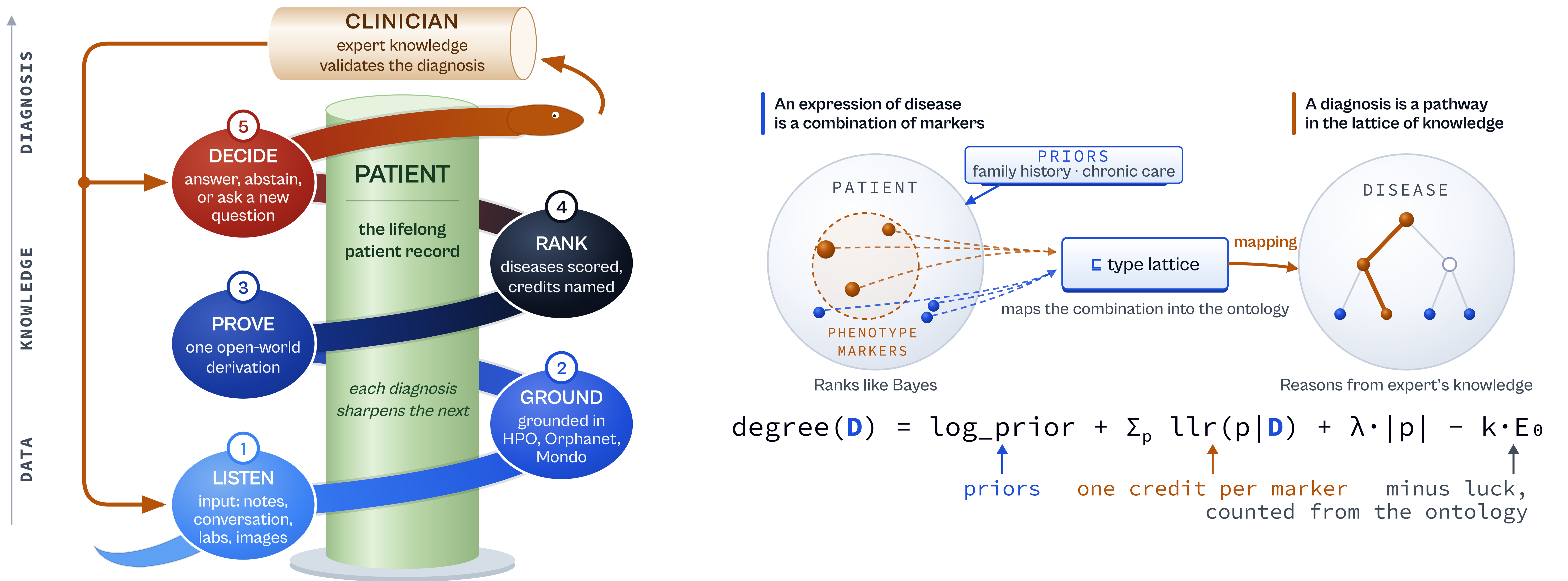
Collaboration with: Dr. Mehdi Kaytoue (Assoc. Prof., INSA Lyon · LIRIS, UMR CNRS 5205) · Dr. Jean-Yves Trosset (Dir., BIRL, Sup'Biotech) · Dr. Luc Ricard (General practitioner)

Introduction

Medical reasoning starts with **incomplete and heterogeneous evidence**. The clinician builds the clinical picture through dialogue, examination and prior knowledge. ReasoningLayer helps verify **which findings support each diagnostic hypothesis** – and **which evidence is still missing**.

Methods

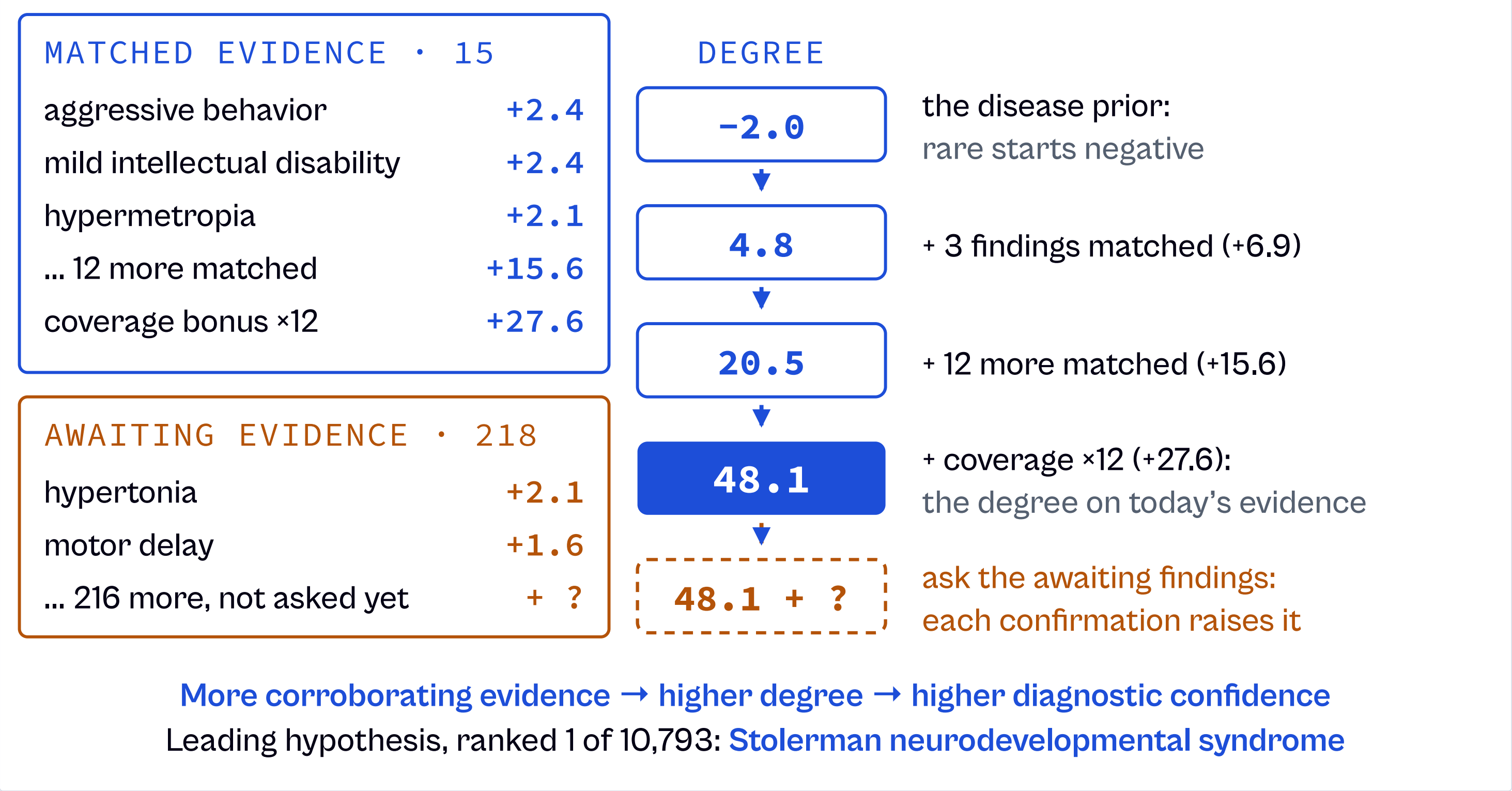
The LLM proposes, the logic disposes – safe by design, unlocking personalised medicine without training.
Counted, not trained · certified, not asserted · a replayable certificate per diagnosis · data sovereignty: on-premise · a personal engine per clinician



Results

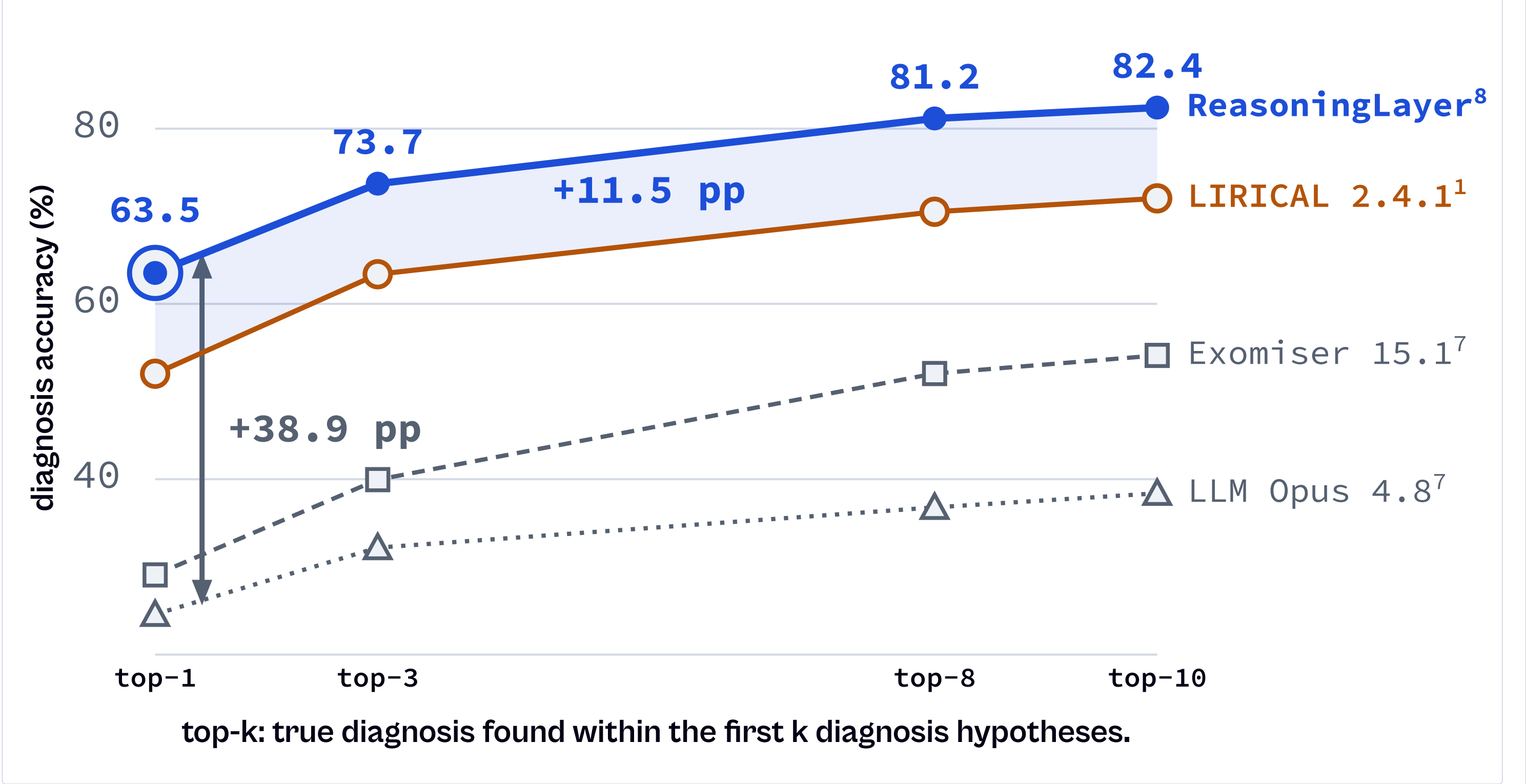
Challenge: Turning *weak signals* into diagnostic evidence

Rare diseases often emerge from **incomplete, heterogeneous and weak** phenotypic signals.



Outperforming both frontier LLMs and traditional ontology solvers

Where does the correct diagnosis rank? 5,349 published cases · the same protocol for every arm.



Discussion

- **Evidence stays visible.** What supports the diagnosis can be inspected. (*Explainability*)
- **Unknown stays unknown.** Missing evidence is not treated as negative evidence. (*Residuation*)
- **Beyond diagnosis.** Nothing here is disease-specific: the same counted, certified reasoning extends to **biomarker discovery** and **drug discovery**.
- **The LLM communicates; logic verifies.** Clinical reasoning remains independently inspectable. (*Auditability*)
- **The path can be replayed.** Evidence and rules reproduce the reasoning. (*Reproducibility*)

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Ethics & data. Public resources only (HPO, HPOA, Orphanet, GA4GH phenopacket-store) and synthetic DDXPlus (CC-BY); no human-subjects data. **Clinical use.** Decision support for qualified clinicians; not a diagnosis. **Collaboration.** INSA Lyon (Mehdi Kaytoue); clinical development with a practising physician partner (Dr. Luc Ricard, general practitioner). **Funding.** Bpifrance (French Tech Émergence, *DeepTech*); The Pool (Région Grand Est). **Competing interests.** The author is affiliated with Kortexya, which develops the systems described.