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From Zadig to Artificial Intelligence: Clinical Observation, Epistemic Fragility, and the Future of Medical Reasoning

By

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ABSTRACT: Background: The rapid integration of artificial intelligence (AI) into clinical practice has revived longstanding debates about the foundations of diagnostic reasoning. While AI systems rely on large datasets derived from past patients, the clinician's craft remains rooted in direct observation, sensory examination, and contextual interpretation. Objective: To trace the intellectual lineage connecting Voltaire's Zadig, the evolution of the clinical method, the deductive tradition exemplified by Sherlock Holmes, and the contemporary challenges posed by AI in medicine. Discussion: Voltaire's Zadig anticipates the logic of modern clinical reasoning through its emphasis on inference from subtle signs. This evidential paradigm reappears in the anatomic and clinical revolution, bacteriology, and evidence-based medicine, and is later embodied in Arthur Conan Doyle's Sherlock Holmes, whose method was explicitly modelled on clinical diagnosis. AI introduces new fundamental risks, including algorithmic affixing, loss of sensory skills, and the perpetuation of historical preconceptions. The internist's observational abilities remain essential for generating primary data and contextualizing algorithmic outputs. Conclusion: The future of medicine requires harmonizing traditional clinical skills with AI-driven tools. The internist must remain a reader of signs, a critic of evidence, and a guardian of epistemic humility.

KEYWORDS: Clinical reasoning, Artificial intelligence, Medical epistemology, Voltaire, Sherlock Holmes, Internal medicine, Diagnostic method.

INTRODUCTION

The integration of artificial intelligence (AI) into clinical practice has generated both enthusiasm and concern. AI systems promise unprecedented diagnostic accuracy, yet they operate exclusively on historical data-information collected, curated, and interpreted by clinicians who never encountered the patient currently before the physician. This raises a fundamental question: how should clinicians balance algorithmic recommendations with the irreplaceable insights derived from direct patient observation?

To explore this tension, it is instructive to revisit an unexpected source: Voltaire's 1747 philosophical tale *Zadig*. In one of its most

celebrated episodes, Zadig infers the characteristics of a missing dog and horse through meticulous observation of subtle traces. This literary vignette anticipates the logic of the modern clinical method: the transformation of signs into hypotheses through disciplined reasoning.

By examining the historical evolution of clinical observation, integrating the deductive tradition of Sherlock Holmes, and juxtaposing these with the epistemological challenges of AI, this essay argues for a renewed appreciation of the internist's sensory and interpretive skills as the foundation upon which algorithmic tools must rest. Voltaire's *Zadig* and the Origins of Inferential Reasoning

In **Zadig our la Destinée**, Voltaire presents a protagonist whose ability to read the world through signs borders on the miraculous. Zadig's deductions—based on footprints, broken branches, and minute environmental clues—are not supernatural but rational. Voltaire uses this episode to critique dogmatism and celebrate empirical reasoning.

This narrative mirrors the essence of clinical practice:

- observation of subtle signs
- integration of disparate clues
- inference about unseen processes
- revision of hypotheses as new evidence emerges

Zadig's method is, in effect, a proto-Bayesian approach: each new sign updates the probability of competing explanations. This anticipates the logic of modern clinical reasoning and the structure of evidence-based medicine.

Sherlock Holmes and the Clinical Method: A Literary Continuation of Voltaire's Zadig

The intellectual lineage of inferential reasoning in medicine does not end with Voltaire. More than a century after Zadig, Arthur Conan Doyle—himself a trained physician—created Sherlock Holmes, a character whose method of deduction is explicitly modelled on clinical diagnosis. Doyle acknowledged that Holmes's approach was inspired by his medical mentor, Dr Joseph Bell, who taught students to infer disease from minute physical signs, mannerisms, and contextual clues. This method, however, has deeper literary roots. The famous episode in which the protagonist deduces the characteristics of a missing dog and horse from subtle traces is widely recognized as a precursor to Holmesian reasoning. As historian Carlo Ginzburg notes, Voltaire's tale represents one of the earliest formulations of the “evidential paradigm” The practice of reconstructing unseen truths from small, seemingly insignificant signs. Holmes's method is essentially clinical: he interrogates, inspects, observes gait and posture, notes Odors, and integrates disparate clues into a coherent narrative. In this sense, Holmes stands as a bridge between Voltaire's philosophical detective and the modern internist. Both characters embody the epistemological foundation of clinical reasoning: the disciplined interpretation of signs.

Integrating Holmes into this genealogy reinforces the central argument of this essay. The clinician's craft—rooted in sensory observation and interpretive judgment has long been celebrated in literature as a model of rational inquiry. As AI becomes increasingly prominent in medical decision-making, the enduring relevance of this humanistic, observational tradition becomes even more apparent.

The Historical Evolution of the Clinical Method Hippocratic Observation

Hippocratic physicians emphasized careful observation of the patient's body, environment, and temporal evolution of symptoms. Disease was understood through phenomenology rather than metaphysics.

Galenic Systematization

Galen introduced elaborate theoretical frameworks that dominated medicine for centuries. Observation persisted, but interpretation was constrained by dogma—precisely the intellectual rigidity Voltaire sought to dismantle.

The Antipolitical Revolution

Between the eighteenth and nineteenth centuries, Morgagni, Bichat, and Laennec correlated clinical signs with post-mortem findings. The stethoscope transformed auscultation into a scientific act. Clinical reasoning became grounded in lesion-based pathology.

Bacteriology era

Pasteur, Koch, and Virchow shifted attention to invisible mechanisms. Clinicians now inferred disease processes that could not be directly observed—echoing Zadig's reconstruction of unseen events.

Evidence-Based Medicine

In the late twentieth century, Sackett and colleagues formalized probabilistic reasoning. Diagnosis became a matter of likelihood ratios, pre-test probabilities, and population-derived evidence.

The Digital and AI era

Machine learning systems identify patterns beyond human perception. Yet they rely entirely on secondary data—records of patients who are not the one in front of the clinician. This introduces new epistemic challenges.

AI and the Epistemological Risks of Data-Driven Medicine. The Problem of Historical Data

AI systems learn from datasets shaped by prior clinicians' biases, incomplete documentation, demographic imbalances, institutional practices, and historical limitations of medical knowledge. Thus, AI does not "see" the patient; it predicts based on ghosts of patients past.

Algorithmic Anchoring

When an AI system suggests a diagnosis, clinicians may unconsciously align their reasoning with it, even when contradictory signs are present. This mirrors cognitive anchoring bias but with a technological twist.

Loss of Sensory Skills

If clinicians rely excessively on AI, they risk neglecting the foundational skills of interrogation, inspection, palpation, percussion, auscultation, and even olfaction. Without these, clinicians cease to generate primary data, and AI becomes the sole source of "evidence"—a dangerous inversion of roles.

The Fragility of Evidence

Medical knowledge evolves. What is evident today may be obsolete tomorrow. AI systems trained on historical data risk perpetuating outdated paradigms unless continuously recalibrated.

The Internist as Counterbalance: Preserving the Art of Observation

The internist's craft is not merely technical; it is epistemological. By engaging the patient through sensory examination and contextual inquiry, the clinician produces unique, individualized data that no algorithm can replicate.

This human-generated information serves three essential functions:

1. anchoring diagnosis in the present rather than the past
2. correcting algorithmic bias through direct observation
3. preserving the relational and ethical dimensions of care

The future of medicine depends on clinicians who can integrate AI's strengths without surrendering their own.

Conclusion

From Voltaire's Zadig to Sherlock Holmes and the age of artificial intelligence, the core challenge of medicine remains unchanged: how to infer truth from signs. AI offers powerful tools, but it cannot replace the clinician's sensory engagement with

the patient or the interpretive wisdom forged through experience.

The task ahead is not to choose between tradition and innovation, but to harmonize them. The internist must remain a reader of signs, a critic of evidence, and a guardian of epistemic humility. Only then can AI serve as an ally rather than a master.

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