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What Computers Still Can't Know? Dreyfus on Artificial Reason, Epistemology and Artificial Intelligence

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1. INTRODUCTION

Can artificial intelligence systems ever possess knowledge? This question sits at the intersection of epistemology and cognitive science, testing whether intelligent behavior can be explained through internal representations or requires essential external conditions. Hubert Dreyfus's critique of early symbolic AI provides the definitive framework: these systems presuppose an "epistemological assumption" that all relevant knowledge can be captured as explicit, context-independent representations manipulated by formal rules (Dreyfus 1979). Against this internalist representationalism, Dreyfus advances a phenomenological externalism: genuine intelligence manifests through embodied, backgrounded skilled coping within shared practices, not detachable inner states (Gehrman and Schwenkler 2020). Contemporary frameworks like predictive processing (PP) and brain-inspired AI appear to challenge Dreyfus by offering biologically plausible alternatives to Good Old-Fashioned AI (GOFAI), potentially vindicating sophisticated internal models as knowledge-constituting.

This essay tests whether these newer paradigms overcome Dreyfus's externalist challenge. Thesis: Neither predictive processing nor brain-inspired AI fully vindicates internalist representationalism; both presuppose the world-involving background and embodiment that Dreyfus identifies as constitutive of knowledge, converging instead on his externalist picture.

The first section reconstructs Dreyfus's target: the epistemological assumption uniting symbolic AI with classical epistemology, and his phenomenological counter-model of skill acquisition grounded in Heideggerian background practices. Drawing on the Dreyfus skill model and recent defenders like Cappuccio (2023), it establishes the criteria any internalist vindication must meet: internal models must exhaustively capture context-sensitive normativity without essential reliance on embodiment or social embedding.

The second section examines predictive processing through Reynolds (2024), who redirects Dreyfus's frame problem critique toward PP's generative models. While PP's hierarchical prediction-error minimization initially promises internalist salvation—treating background as tunable priors—it fractures into brain-bound versus embodied readings, with only the latter addressing Dreyfus at the cost of externalist concessions.

The third section tests brain-inspired AI (neuromorphic systems, spiking networks) via Farisco et al. (2024), Gahrn-Andersen (2025), Svensson (2023), and Halpin

(2025). These architectures yield representational gains over symbols, yet face unified Dreyfusian objections: disembodiment (Floridi via Gahrn-Andersen), lack of organic temporality (Svensson), and absence of collective social intelligence (Halpin). Farisco et al.'s own limits underscore the gap.

By these test cases, Dreyfus's externalism withstands contemporary challenges. The paper clarifies AI's epistemological limits and reframes the internalism-externalism debate through phenomenology, with implications for both AI design and philosophical accounts of know-how.

2. EPISTEMOLOGICAL ASSUMPTION AND EARLY AI

In Hubert Dreyfus's vision, early symbolic AI projects essentially rest on a notable and substantive epistemological assumption: under this framework, intelligence consists in the application of explicit, context-independent knowledge to formal representations (Dreyfus 1979, 22). In the report "Alchemy and AI" and the book What Computers Still Can't Do (1972), Dreyfus illustrates early symbolic AI as the assumption that intelligent behavior can be reproduced by a system that is able to store explicit descriptions of the world, then applying formal rules to these: "It is assumed that, in principle at least, human behavior can be represented by a set of independent propositions describing the inputs to the organism, correlated with a set of propositions describing its outputs" (Dreyfus 1979, 193). According to this position, knowing how to act is, fundamentally, to possess internally represented facts and procedures that, theoretically, may be fully articulated.

Although not yet using the (later) terminology of "epistemological assumption" in the RAND report, Dreyfus's target is already perceptible: all knowledge relevant to intelligent performance can be rendered as explicit, context-independent information in the device, without depending on an embodied or practical engagement with the world. Therefore, reasoning consist in the manipulation of these representations, according to syntactic procedures, until an appropriate output is, then, derived.

In classical programs for Chess, understanding of natural languages or problem-solving, premises, rules and goal states are encoded explicitly. The success of these programs depends on how the completeness of their representation of the world, and how effectively they search the resulting problem space: Chess programs "attained early success with simple limited search" (Dreyfus 1979, 9), but eventually ran into "the problem inevitably connected with choice mazes: exponential growth" (Dreyfus 1979, 19). Pattern-recognition and language-translation systems, likewise, rely on stored lists of traits and dictionary entries, struggling when the combinatorics and context-sensitivity of natural use explode beyond what can be exhaustively enumerated (Dreyfus 1979, 12-14, 30-35).

Dreyfus, then, interprets this to reveal an underlying conception of knowledge: (1) detached, (2) propositional and, on paper, (3) fully articulable. If an agent behaves in an intelligent manner, there must exist an internal database of true sentences or structured symbolic tokens that captures what it knows, and which skilled behavior can be reconstructed as the outcome of rule-governed operations, at the database's level. As he

later conveys, “those who make the epistemological assumption […] affirm that all nonarbitrary behavior can be formalized according to some rules, and that these rules, whatever they are, can then be used by a computer to reproduce the behavior” (Dreyfus 1979, 190). What Dreyfus will, later, name as “epistemological assumption” is, to this end, the claim that everything relevant in rational performance can be explained and represented inside the system; nothing depends essentially on how the agent is bodily situated or practically engaged with the world (Dreyfus 1979, 190-191).

This conception will combine naturally with an internalist and representationalist view in Epistemology, according to which knowledge is, primarily, a matter of the appropriate internal states: representations that reflect the world in an accurate way and stand in the right inferential relations, rather than being embedded in specific worldly practices.

2.1. Background, Embodiment and Skilled Coping

Opposing this framework, Dreyfus mobilizes phenomenological descriptions from both Heidegger and Merleau-Ponty to postulate that human intelligence is grounded in an embodied and pre-theoretical background, rather than in an inner store of explicit representations. Gehrman and Schwenkler (2020, 123) summarize his “fundamental insight” as the rejection of a Platonic conception of human beings as rational, individual agents, in favor of a picture in which “human beings are embedded, absorbed and embodied”.

Rather than existing as ideally self-directed and explicitly purposive rule-followers, the normally functioning human mind is typically “responsive, self-forgetful, ‘absorbed copers’ whenever we function normally (competently) and expertly” (Gehrman and Schwenkler 2020, 123-124). Ordinarily, we do not typically consult inner models or apply rules to representations; we cope with the environment in a seamless and absorbed way.

Stuart and Hubert Dreyfus develop their model of skill acquisition to sharpen the contrast between rule-following and expert performance: at the (1) novice stage, the learner “acquires rules for determining actions” on the basis of very clearly defined and context-free features (Dreyfus and Dreyfus 2009, 21). Experience will, then, accumulate, and (2) advanced beginners and (3) competent performers rely more heavily on situational cues and holistic perception, learning to recognize meaningful elements that “neither an instructor nor the learner can define in terms of objectively recognizable context-free features (Dreyfus and Dreyfus 2009, 22-23). At the (4) proficient and (5) expertise levels,

the actor “generally knows what to do based on mature and practiced understanding”; when deeply involved “he does not see problems in some detached way and work at solving them”, and “need be no more aware of [his skill] than he is of his own body” (Dreyfus and Dreyfus 2009, 30).

The presented framework illustrates that genuine expertise is not founded on increasingly sophisticated internal representations, but rather on the gradual sedimentation of bodily attunement to a field of practical possibilities.

What makes an action intelligent is not that it instantiates a previously formulated plan, but that it manifests a background sensitivity to what a given scenario calls for.

More recent work on skill and expertise reinforces this anti-intellectualist reading. Cappuccio argues that expert performance is characterized by “confident, spontaneous, richly flexible, and intelligently adaptive” control (Cappuccio 2023, 8), where reflective self-monitoring and propositional guidance tend to disrupt, rather than ground mature skill (Cappuccio 2023, 49).

Drawing on Ryle’s “crucial objection” to intellectualism, he stresses that no finite set of propositions can “exhaustively specify the correct modality of its own application” (Cappuccio 2023, 42-43), since applying any such rule in a correct manner is itself a skilful activity that cannot be reduced to further rules, on pain of regress. These considerations ultimately support Dreyfus’s assertion that know-how cannot be built up from, nor fully captured by, know-that.

In this sense, the phenomenological notions of background and skilled coping function as epistemic categories. They describe how an agent is already attuned to what is relevant, what counts as a mistake and which answers are appropriate, without the need to represent and internally justify these norms as propositions.

Therefore, to know how to act in a given situation is, on this view, not a matter of possessing an inner description of it, but of being practically geared into a world structured by significance.

From Phenomenology to Externalism about knowledge

When considered together, these considerations yield a form of phenomenological externalism about knowledge. For Dreyfus, what an agent knows cannot be read off from an inner inventory of representations; it supervenes on the agent’s ultimately embodied position in the world and its participation in socially organized practices. As Gehrman and Schwenkler presented, when we attend to our characteristic embodiment “we see that human intelligence is first and foremost, and most fundamentally, practical as opposed to

theoretical", and that theory is "merely one species of – doing" (2020, 124). The standards that determine (1) whether a move can be seen as skillful, (2) whether an interpretation is appropriate, or (3) whether a reaction is rational are not fixed by what is introspectively available to the subject is immersed.

Consequently, the attempt to model human reason as the operation of explicit, context-free knowledge structures, inside a device, is not merely technically premature: it misdescribes the very phenomenon of knowing by treating it as an (1) internal and (2) representational state, detached from embodied engagement.

Any framework that aims to vindicate an internalist, representationalist account of knowledge against Dreyfus must, therefore, do nothing more than posit richer internal models, showing, in addition, that such models can fully capture this world-involving background of skill and normativity, or else concede that knowledge will remain essentially external.

Any internalist vindication must show these models capture world-involving background OR concede Dreyfus's externalism.

3. PREDICTIVE PROCESSING AND DREYFUS'S CHALLENGE (REYNOLDS)

Predictive Processing (PP) models propose the brain as a hierarchical prediction machine that uses stored knowledge and approximate Bayesian inference to predict incoming sensory signals from the world, including the state of its own embodiment (Reynolds 2024, 9). According to PP models, the brain does not passively record inputs and then compute action plans, as in early Computationalism and GOFAI. Instead, it is "always actively developing and testing hypotheses about the world" (Reynolds 2024, 9).

PP theorists typically claim that the brain continuously anticipates upcoming sensory inputs and creates generative "internal" models of its environment – representations whose role is to reduce prediction error, that is, to minimize any possibility of a mismatch between predicted and actual input (Reynolds 2024, 10).

When an unexpected input arrives, resources are deployed to find the source of the mismatch in the brain's model (encoded as probability density functions) and to revise that model (Reynolds 2024, 10), so that any error is allayed.

It's relevant that these predictions are not primarily aimed at constructing an objective and detached map of the world; they are pragmatically oriented around controlling action, keeping the organism viable, with a stable grip on its environment and within homeostatic bounds (Reynolds 2024, 10).

Superficially, this picture seems to be a powerful ally for internalist representationalism. The generative model presents itself as a richly structured internal representation; its parameters encode what the system "takes" the world to be like, and learning becomes a matter of revising those representational states in light of error.

Belief-like states and probabilistic inference are, therefore, "crucial to all versions of the view" (Reynolds 2024, 9). Assuming, as some authors propose, that "it is the generative model itself that functions as the locus of behavioral control […] and not some direct coupling with the environment" (Williams 2018, 160, cited in Reynolds 2024, 10), then the heart of cognition lies in this inner model.

One could feel tempted to say that knowledge is merely having a sufficiently accurate and well-tuned internal model, whose structure alone fixes the rational structure of the system.

Reynolds frames this apparent promise of PP against the background of Dreyfus's original critique of GOFAI. Dreyfus "held that GOFAI models of the mind (symbolic and

computational) would be unable to emulate or surpass human intelligence in many dynamic real-world contexts, essentially due to the frame problem" (Reynolds 2024, 3).

The frame problem, for Dreyfus, relates to how any information-processing system might quickly and flexibly sort relevant from irrelevant information and operations "without some pregiven 'frame' or script," a task that proved computationally intractable for GOFAI and, if solved only by programmer-fixed frames, would "defeat the purpose of the very idea of AGI" (Reynolds 2024, 3).

His critique left open the possibility that non-GOFAI models – connectionist, Bayesian PP, active inference – might perform better (Reynolds 2024, 3). PP, thus, presents itself as the kind of alternative that might address these difficulties by building relevance and flexibility into the internal generative architecture.

Despite that, Reynolds notes that Dreyfus framed the relevant difference between human and artificial cognitive systems not just in computational terms, but also in terms of context-dependent "common-sense," "intuition" or "creative abduction," and skilled human "expertise" (Reynolds 2024, 3). On Dreyfus's portrayal, expertise is intuitive, rather than explicitly rule-governed; instead of being mysterious, such intuition is "grounded in the context-sensitive and holistic nature of our embodied habits" (Reynolds 2024, 3).

These embodied habits and skills scaffold common-sense knowledge and flexible problem-solving, but, for GOFAI, algorithmically programming such capacities proved "much more difficult than anticipated," leading to issues regarding (1) new contexts, (2) deciding which stored information to update, (3) infinite regress in "rules about the application of rules," and (4) deixis, i.e., establishing the relevant concepts of "here" and "now" (Reynolds 2024, 3–4).

Dreyfus, then, illustrates that context-independent symbols aiming to serve as representational states "will not emulate the sorts of contextualized practical understanding that humans have" (Reynolds 2024, 4).

Pursuing this goal, Reynolds links Dreyfus's critique to his Heideggerian meaning holism: Dreyfus's account of practical understanding is "indebted to the philosophy of Heidegger," who treats contexts as "complex, network-like semantic structures" defined with reference to an agent's concerns and projects and embedding social norms (Reynolds 2024, 4). The familiar example is Heidegger's hammer within an "equipmental nexus" that includes nails, planers, fences, and so on, all given meaning by the project of fixing a fence (Reynolds 2024, 4).

Beyond the core equipment, there are more marginal connections, that belong to a wider "field" of affordances (Bruineberg and Rietveld 2014, cited in Reynolds 2024, 4). An item can present as an affordance in one context, but not in another: Ryle's (1) cigarette in a hospital, (2) the rabbit's burrow as either refuge or bed, depending on predators and time of day, or (3) a bottle of water that solicits attention when placed for a lecture, but not when already in the room beforehand (Reynolds 2024, 4). For Dreyfus, these shifting patterns of salience and affordance are connected to embodied skills and morphologically constrained bodies, not with a neutral stock of inner symbols (Reynolds 2024, 4). Humans "make all sorts of formal reasoning errors," Reynolds notes, but "this context-sensitivity is a strength" (2024, 4).

The core question that arises, in this case, is whether PP's inferential architecture can capture this Dreyfusian picture of skilled, context-sensitive coping, or whether it merely rephrases the old frame problem. PP theorists claim that bodily adjustments and "epistemic actions" that restructure the environment count as forms of inference, dubbed "active inference," because they also serve the goal of prediction-error minimization (Reynolds 2024, 11). The hope is that by unifying perception, action, and learning under a single mathematical framework, sometimes articulated in terms of minimizing variational free energy, PP can model both the online, embodied side of skill and the offline, representational side of knowledge (Reynolds 2024, 11).

If successful, this framework might show that what Dreyfus ascribed to unanalyzable "intuition" and backgrounded know-how can, in fact, arise from the operation of a sufficiently rich generative model, therefore rescuing an internalist, representational account.

Reynolds doubts that matters are so straightforward, stressing that versions of PP differ in how "internalist or brain-bound" they are, with Hohwy presenting "a more classically internal representational picture than Clark and Friston," yet, even on more embodied accounts, there remains "some detachability of the model from the environment" (Reynolds 2024, 10).

The generative model is still treated as the locus of control, and its success is evaluated by an abstract criterion of error minimization. From a Dreyfusian standpoint, this threatens to underplay the way in which embodied habits (and social practices themselves) constitute intelligibility, rather than merely constraining an antecedently intelligible inner model.

If we press the embodied, pragmatically oriented side of PP, we approach

Dreyfus's claim that backgrounded practical understanding is primary and theoretical representation derivative. If we, instead, emphasize the detachability and inferential autonomy of the generative model, we risk re-inscribing the very internalist, context-independent conception of knowledge that Dreyfus saw as a philosophical error.

On a more sympathetic reading, predictive processing offers a partial reconciliation, by preserving Dreyfus's insight that intelligent behavior is grounded in context-sensitive, embodied habits and in a holistic field of affordances, while showing how such patterns might be described in terms of probabilistic generative models. However, this reconciliation comes at the cost of weakening the internalist hope: the generative model only functions as knowledge within an already structured world of projects, norms, and bodily capacities, that no purely internal description can exhaust.

PP offers partial representational vindication but requires embodiment that echoes Dreyfus.

4. BRAIN-INSPIRED AI AND ARTIFICIAL KNOWERS

Brain-inspired AI deviates from Dreyfus's symbolic AI target by seeking "to introduce structural and operational principles of the brain into the design of computing algorithms and devices" (Poo 2018, cited in Farisco et al. 2024, 5).

Neuromorphic systems, spiking neural networks, and deep neural networks (DNNs) emulate biological neural organization, learning connection strengths from data, rather than fixed rules (Farisco et al. 2024, 2, 5). These architectures yield consistent advantages, such as "increased computational power per unit of energy consumed" and robust learning, circumventing the von Neumann bottleneck through brain-like in-memory computing and spike latency codes (Farisco et al. 2024, 5, 8). By mimicking neural dynamics, in lieu of simulating them, they promise energy efficiency and scalability beyond traditional systems (Farisco et al. 2024, 9). This biological plausibility positions brain-inspired AI as stronger candidates for genuine cognition than GOFAI.

From an internalist perspective, these systems' internal states appear to be epistemically promising. Learned weights encode environmental regularities; network activation patterns function as representations with accuracy conditions, where success depends on training quality and generalization (Farisco et al. 2024, 6). Spiking neural units and online spatio-temporal learning algorithms even improve natural language processing, suggesting that brain-like architectures might overcome deep learning's limitations (Farisco et al. 2024, 13).

If model quality fixes epistemic standing, brain-inspired AI instantiates artificial knowers whose knowledge resides in parametrized representations, against Dreyfus.

And yet, Dreyfus's externalist challenge persists across three dimensions: (1) even brain-like architectures like LLMs remain disembodied. Luciano Floridi argues they exhibit "agency without intelligence," processing texts statistically without understanding (cited by Gahrn-Andersen 2025, 3105). By passing the Turing Test, "human practical comportment is irreducible to the enactment or evocation of concepts," making it "extremely difficult, if not impossible for symbol processing LLMs to convincingly represent aspects of our sociopractical lives" (Gahrn-Andersen 2025, 3105).

Image generation reveals that individual elements make sense, but "the issue seems to relate specifically to how these elements are combined […] into a meaningful whole" (Gahrn-Andersen 2025, 3106). As Heidegger suggests, "absorbed coping precedes, and enables our propositional cognition," grounding understanding in praxis no

network emulates (Gahrn-Andersen 2025, 3107).

(2) Genuine intelligence demands an organic embodiment. Jakob Svensson argues that it requires an "organic body" confronting "unfolding situations in the present moment," where "intelligence … include[s] a time-bound organic body acting in a changing environment" (Svensson 2023, 370).

Disembodied AI reflects hopes that "information can circulate unchanged among different material substrates," but Damasio counters by arguing that "no body, never mind" (cited by Svensson 2023, 368–69). Brain-inspired systems replicate neural dynamics without metabolic vulnerability or lived temporality, lacking the background conditions that make situations meaningful for Dreyfus.

(3) Harry Halpin reveals intelligence as inherently collective, not individual. The "intelligent autonomous individual is an ideological construct" justifying capitalist rationality; AI's "master vision" assumes "every aspect of […] intelligence can […] be precisely described" within individuals (Halpin 2025, 4594, 4590). Yet "intelligence extends outside of the human individual's biologically bound brain" via "dynamic cognitive integration of biological and extra-biological components […] joining together as a collective" (Halpin 2025, 4600).

Human intelligence, then, emerges from "distributed cognition […] inexorably social," founded in "acts of communication which allow humans to co-ordinate and shape their worlds" through "interiorization and exteriorization […] mediated by social relationships" (Halpin 2025, 4600). Rather than isolated brains, individuals form via "individuation, which includes both adapting to and inventing their social and technological world" (Halpin 2025, 4601). Brain-AI lacks this communal participation in norm-giving practices.

These critiques will, ultimately, converge on Dreyfusian externalism. Farisco et al. acknowledge brain-inspired AI's operational limits: biological realism varies by level, and even neuron-like behavior may not yield brain-like computation (Farisco et al. 2024, 6). Gahrn-Andersen, Svensson, and Halpin show that without embodiment, organic temporality, and social embedding, internal states remain decoupled from world-involving practices. Farisco et al. warn of anthropocentric bias mistaking brain-likeness for intelligence, risking misplaced trust like with LLMs (Farisco et al. 2024, 20, 10).

Brain-inspired AI offers modest representational gains, since networks track patterns more flexibly than symbols (Farisco et al. 2024, 6). Yet, pursuing Dreyfus's challenge reveals its externalist core: the more brain-like AI becomes, the more it

presupposes embodied, socially embedded backgrounds no internal model exhausts. Knowledge manifests not as detachable representations, but as skilled absorption within shared, meaningful worlds. Halpin's collective intelligence gestures beyond Western individualism toward "radical relationality" distributing cognition across humans, machines, non-humans, and environments (Halpin 2025, 4601). This echoes Dreyfus: intelligibility arises from practical holism, not inner structure alone. Brain-AI gains are modest; full Dreyfusian externalism stands.

5. CONCLUSION

Neither predictive processing, nor brain-inspired AI overcomes Dreyfus's phenomenological externalism about knowledge: we present, first of all, Dreyfus's target—the epistemological assumption that intelligence reduces to explicit, internal representations—and his alternative: embodied skilled coping within a holistic background of significance, focusing then on PP's partial promise: Reynolds (2024) reveals generative models as richer representations than GOFAI symbols, yet their success demands embodied active inference that echoes Dreyfusian world-involvement. Finally, this pattern is confirmed in brain-inspired architectures: Farisco et al. (2024) document neuromorphic gains, but Gahrn-Andersen (2025), Svensson (2023), and Halpin (2025) expose irreducible deficits in embodiment, organic temporality, and collective social practices.

We can, then, conclude that these paradigms achieve modest internalist advances but presuppose the external conditions Dreyfus deems primary—backgrounded normativity arising from practical absorption, not inner structure alone. AI epistemology must thus reject strong representationalism for hybrid or externalist models. Looking forward, this invites AI design to prioritize situated agency over isolated cognition, and philosophy to integrate phenomenological insights with computational successes. Dreyfus's challenge, far from obsolete, reframes the quest for artificial knowers as participation in shared meaningful worlds, not their internal duplication.

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