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Phantom Objectivity: Intersubjective Knowledge in Complex Domains of Informal Structure

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ABSTRACT

This paper advances three interconnected logical claims: First, that epistemological neutrality is fundamentally unattainable due to inherent cognitive, social and historical contingencies; second, that intersubjective frameworks offer a viable alternative to both naïve objectivism and radical relativism; and third, that Complex Domains of Informal Structure provide a particular case in which these epistemic limitations are manifested and can be productively managed through Knowledge Management of Strategic options through Soft Systemic Analysis frameworks. The impossibility of absolute neutrality is demonstrated through theoretical arguments exploring how even foundational scientific theories contain underdetermined elements requiring subjective interpretation; historical arguments showing how paradigmatic shifts reframe supposedly objective truths; and practical arguments revealing how AI solutions trained on ostensibly "neutral" data reproduce social biases. The paper systematically develops its argument through the analysis of fundamental epistemological concepts, drawing on both Western and Eastern philosophical traditions to establish the limitations of traditional epistemology. It then examines how these limitations manifest particularly in Complex Domains of Informal Structure, where tacit knowledge, specialist interpretation, and contextual understanding shape decision-making. Through examination of concrete applications in healthcare, urban planning, and algorithmic governance, the paper demonstrates how intersubjective approaches can acknowledge the unavoidable presence of subjectivity while

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establishing reliable epistemic frameworks for knowledge validation. This structured reflection ultimately advances a more sophisticated understanding of how knowledge is validated, disseminated, and applied across domains from scientific research to artificial intelligence development.

Keywords: Epistemological Neutrality; Complex Domains of Informal Structure; Intersubjectivity; Artificial Intelligence; Knowledge Decision-Making

1. Introduction

The notion of epistemological neutrality remains a persistent subject of contention across philosophical and scientific discourse. Whilst objectivity stands as a foundational principle of scientific inquiry, its attainability constitutes an open question. Can knowledge truly exist independently of human perception, cultural frameworks, and historical contexts? This paper critically examines the limitations of epistemological neutrality, contending that absolute objectivity represents an unattainable ideal. However, it argues that rejecting absolute objectivity need not lead to epistemic relativism. Rather, structured intersubjectivity offers a pragmatic and robust framework for knowledge validation, particularly in domains where conflicting perspectives require reconciliation.

The discussion begins by analysing the fundamental concepts of objectivity, subjectivity, and epistemological neutrality. It then explores how these issues manifest in Complex Domains of Informal Structure (CDIS), particularly within artificial intelligence, cognitive modelling, and decision-making environments. For the benefit of readers unacquainted with the concept, CDIS can be defined as knowledge spheres where data is unstructured, expertise is predominantly tacit, and decisions are contingent on understanding and contextual nuance. Examples of this phenomenon include:

- "The hospital ward under discussion is one in which clinicians, nurses and artificial intelligence tools are required to interpret ambiguous patient symptoms and coordinate treatments."
- "The housing bureau of a city is tasked with the responsibility of balancing demographic pressures, real estate trends, and community narratives in order to zone urban development."
- "A university committee is tasked with the formulation of a novel admissions policy, a delicate process that involves a multifaceted balancing act between equity metrics, pedagogical objectives, and the constraints imposed by political considerations."

In these domains, unstructured data and tacit knowledge challenge conventional claims of neutrality, raising critical questions about the reliability, fairness, and ethical implications of cognitive solutions. The knowledge in question resists codification, and certainty is rare. These are precisely the environments, the domains, in which traditional models of objective decision-making falter, and where intersubjective epistemologies, such as those proposed herein, offer vital guidance. The paper evaluates an adaptive framework, particularly Knowledge Management of Strategic Options through Soft Systemic Analysis (KMoS-SSA), as a potential strategy for managing epistemic uncertainty, ensuring that knowledge remains robust and methodologically sound in contexts where human and artificial intelligence increasingly intersect.

The crux of this debate lies in the inquiry into the extent to which knowledge can be considered entirely objective, unencumbered by the viewpoint of its originator, or whether it is inextricably influenced by subjective components. The paper posits that, while absolute objectivity remains unattainable, epistemic relativism can be mitigated by frameworks that methodically address the subjective. The article employs a conceptual analysis of classical and contemporary epistemological perspectives to examine how these frameworks navigate the subjectivity inherent in knowledge production, particularly in domains where artificial intelligence and cognitive solutions shape critical decision-making processes.

The paper demonstrates that absolute objectivity is an unattainable but avoidable epistemic relativism, thereby emphasising the need for structured intersubjectivity in the production of knowledge. In order to address these issues systematically, the article followed a structured literature review and conceptual analysis, synthesising classical and contemporary epistemological perspectives and evaluat-

ing their implications for the determination of a cognitive solution, its design and its subsequent implementation. This methodological approach examines how intersubjective frameworks can navigate the subjectivity inherent in knowledge production, particularly in fields where artificial intelligence, conceptual modelling and possible cognitive solutions shape critical decision-making. Through rigorous argumentation, it systematically considers and refutes counter-arguments, reinforcing its position and offering a comprehensive perspective on the problem of epistemological neutrality and its implications for contemporary knowledge ecosystems.

2. Methodological Approach

This paper employs a structured literature review and conceptual analysis to examine epistemological neutrality in knowledge production. It draws upon foundational philosophical perspectives—including those of Kant, Popper, Kuhn, and Longino—to critically evaluate the feasibility of objectivity and identify points of convergence and divergence amongst key theories.

Whilst not directly concerned with epistemological neutrality, the KMoS-SSA framework provides a valuable methodological perspective. This framework is designed for the strategic management of knowledge in CDIS environments, where knowledge is predominantly tacit and held by specialists with diverse perspectives on reality. These perspectives are inherently subjective, reflecting distinct cognitive frameworks, disciplinary biases and experiential interpretations. Constructing effective cognitive solutions within CDIS requires the reconciliation of these perspectives and the establishment of shared epistemic ground—a process that intersects directly with the problem of epistemological neutrality. This necessitates the management of knowledge disputes, minimisation of bias, and intersubjective agreement whilst acknowledging the impossibility of absolute objectivity.

The selection of philosophical sources follows a methodical approach, prioritising foundational epistemological works alongside contemporary analyses of objectivity, subjectivity and knowledge validation. The canonical works of Kant, Popper, Kuhn, Longino and Habermas were selected for their profound influence on epistemological discourse, whilst recent literature on epistemology and knowledge management in CDIS ensures relevance to modern cognitive challenges. This dual emphasis creates a bridge between classical philosophical perspectives and contemporary issues in artificial intelligence, decision-making and cognitive modelling.

The investigation proceeds through a systematic structure. First, we establish the fundamental concepts of objectivity, subjectivity and epistemological neutrality. Next, we explore their manifestations within Complex Domains of Informal Structure through interdisciplinary perspectives. Finally, we evaluate approaches to overcoming the limitations of absolute objectivity, culminating in a synthesis of key arguments and their implications for knowledge systems in complex domains.

This paper adopts a deliberately analytical style that employs logical argumentation, conceptual analysis and systematic evaluation of evidence. This approach reflects our commitment to rigorous philosophical inquiry whilst recognising that such a systematic treatment necessarily represents one among many possible approaches to knowledge. Indeed, the paper's style—with its formal structure, logical progressions and theoretical abstractions—exemplifies the propositional mode of knowing that Reason and Heron identify [1]. This stylistic choice aligns with our objective of providing a disciplined philosophical analysis whilst acknowledging that "realistic reflection" ultimately requires engaging with knowledge in its full human context—experiential, presentational and practical as well as propositional. The analysis therefore serves not as an endpoint but as a contribution to ongoing dialogue between philosophical theory and lived practice.

Logical Structure and Argumentative Framework

This paper employs a structured logical architecture to establish its claims about epistemological neutrality:

Premise 1: Knowledge production invariably occurs within cognitive, social, and historical contexts that shape perception, interpretation, and evaluation.

Premise 2: These contextual factors cannot be fully eliminated from knowledge production processes, even with rigorous methodologies.

Premise 3: CDIS particularly exemplify this contextual dependence through their reliance on tacit knowledge and diverse specialist perspectives.

Intermediate Conclusion 1: Absolute epistemological neutrality is therefore unattainable in principle.

Premise 4: Abandoning neutrality as an epistemic ideal need not entail embracing radical relativism.

Premise 5: Intersubjective frameworks can distribute and manage subjectivity through structured collaborative processes.

Intermediate Conclusion 2: Intersubjective approaches offer a viable alternative to both naive objectivism and radical relativism.

Final Conclusion: In CDIS, knowledge management should employ intersubjective frameworks that acknowledge and systematically address inherent subjectivity rather than pursuing an impossible neutrality.

3. Objectivity, Subjectivity, and Epistemological Neutrality: Foundational Concepts in the Complex Structure of Knowledge

3.1. Objectivity in Knowledge

Knowledge is deemed objective when its validity transcends individual or collective perspectives, beliefs, or interpretations [2]. In mathematics and the natural sciences, objectivity is characterised by rigorous methodologies—including logical deduction and experimental validation—designed to minimise subjective influences [3]. This conception stems from Enlightenment ideals that position knowledge as attainable through neutral, replicable methods—a principle that remains central to contemporary scientific inquiry [4].

3.2. Subjectivity of Knowledge

Conversely, knowledge is considered subjective when its validity depends upon individual experiences, interpretative frameworks, or conceptual paradigms [5]. Within scientific and mathematical discourse, subjectivity emerges through hypothesis selection, data interpretation, and the paradigmatic contexts framing research [6]. In the work by Kuhn [5], showing how scientific understanding remains inextricably linked to socio-cultural and cognitive contingencies, he argues that scientific progress operates within paradigms that define legitimate knowledge at particular historical moments.

3.3. Epistemological Neutrality

Epistemological neutrality refers to the proposition that knowledge can be acquired and assessed objectively without influence from values, interests, or sociocultural biases. This notion faces substantial critique from philosophers of science, who demonstrate how all research operates within theoretical paradigms, prior assumptions, and external factors that inevitably shape the construction and legitimation of knowledge [5,7]. Recognising the challenges of achieving pure objectivity, various epistemologists advocate for intersubjectivity as a more pragmatic criterion for knowledge evaluation [8].

3.3.1. Distinguishing between Epistemological Neutrality and both Objectivity and Subjectivity in Knowledge

Prior to embarking upon an examination of the technical distinctions, it is recommended that the following scenario be considered: a courtroom in which different witnesses recount the same event. Each testimony is a subjective account, while the court seeks to ascertain objective truth. However, the very rules of evidence and questioning–the epistemological framework–shape what counts as knowledge. This everyday example illustrates the three interrelated yet distinct concepts that must be carefully distinguished: objectivity (the correspondence between claims and reality), subjectivity (the perspective-dependent nature of understanding), and epistemological neutrality (the question of whether we can ever approach inquiry without preconceptions). These distinctions, though seemingly subtle, have a profound influence on the validation of knowledge in both theoretical and practical contexts.

Although these concepts are frequently conflated in scholarly discourse, epistemological neutrality maintains a distinct philosophical position from both objectivity and subjectivity in knowledge. These distinctions are crucial for understanding the central arguments of this paper.

The concept of epistemological neutrality pertains to the process of knowledge acquisition. More specifically, it concerns the question of whether it is possible to approach inquiry without presuppositions, values, or theoretical

frameworks influencing observation and interpretation. The subject under discussion is the relationship between the knower and the methodology of knowledge-gathering. Objectivity and subjectivity are, in contrast, associated primarily with the characteristics of knowledge claims and their relationship to reality.

For instance, consider the domain of medical research concerning a controversial treatment:

- **Epistemological neutrality** is defined as the principle that researchers should be able to approach the study of a particular phenomenon without being influenced by prior training, theoretical commitments, institutional pressures, or personal experiences. This approach is focused on the possibility of achieving a pristine, unmediated investigative stance.
- **Objectivity in knowledge** concerns whether the resulting findings—efficacy rates, side effects, cost-effectiveness—correspond to reality independently of who conducts the research, with the focus on knowledge as a product that accurately represents its subject matter.
- The concept of **subjectivity in knowledge** pertains to the manner in which the interpretative frameworks of researchers, the disciplinary paradigms to which they subscribe, and their respective contextual positions inevitably influence the aspects of the treatment that are studied, the metrics that are prioritised, and the determination of statistical significance.

This tripartite distinction reveals how epistemological neutrality operates at a more fundamental level than the objectivity-subjectivity dynamic. Objectivity and Subjectivity concern the nature of knowledge claims themselves, while Epistemological Neutrality questions the very possibility of approaching inquiry from an unmediated position.

Moreover, these concepts are associated with validation frameworks in divergent ways:

- The **objective** nature of the phenomenon may be enhanced through methodological rigour, replication, and intersubjective verification, potentially approximating (though never reaching) some correspondence with reality.
- The management of **subjectivity** can be achieved through the establishment of transparency regarding interpretative frameworks, disciplinary standpoints, and contextual factors that shape research.
- This paper posits that **epistemological neutrality** is not a matter of degree, but rather an unattainable ideal. It is argued that it is not possible to eliminate the foundational contexts through which all observation and reasoning occurs, either partially or in their totality.

This distinction elucidates the rationale behind frameworks such as KMoS-SSA's approach to knowledge management. Contrary to the pursuit of an impossible neutrality through the elimination of subjectivity, these frameworks explicitly acknowledge and systematically manage the inevitable contextual elements in knowledge production through structured intersubjective processes.

3.3.2. The Problem of Epistemological Neutrality

A central concern in epistemology is ensuring that the limitations of neutrality do not impede scientific advancement. Logical positivism conceives science as a cumulative process founded on neutral empirical observations and rigorous evidence [9]. Scientific research, akin to mathematics and formal disciplines, operates on the premise that objective, universal truths are attainable. Uncontrolled subjectivity undermines knowledge reliability and erodes rational decision-making by introducing unverifiable observations [3], necessitating methodological frameworks that minimise subjective influence through rigorous testing and validation.

The impossibility of absolute neutrality can be demonstrated through three critical arguments: First, the theoretical argument, wherein even our most foundational scientific theories contain underdetermined elements requiring subjective interpretation [5]; second, the historical argument, wherein scientific paradigms experience radical shifts that reframe supposedly objective truths [5]; and third, the practical argument, wherein AI systems trained on ostensibly "neutral" data repeatedly reproduce social biases [10]. These arguments, when taken together, form a cumulative case against epistemological neutrality that cannot be dismissed by appealing to methodological safeguards alone. Instead, they necessitate reconceptualizing

objectivity as an intersubjective achievement rather than an individual epistemic state.

Moreover, in applied domains such as artificial intelligence, economics, and medicine, the absence of neutrality has the potential to result in models skewed by political or ideological interests, thereby compromising their accuracy and fairness [10]. To mitigate these risks, rigorous methodologies, peer review, and replicability serve as safeguards, although knowledge invariably remains conditioned by its historical and social context [8].

3.3.3. Knowledge Through the Lenses of Objectivity, Subjectivity, and Epistemological Neutrality

In this context, knowledge may be defined as justified true belief about facts or phenomena acquired through experience, logical reasoning, or systematic observation. It is constructed through diverse reasoning methods—induction, deduction, and abduction—yielding conclusions validated within specific epistemic frameworks [11]. Traditional epistemology holds that knowledge requires three fundamental conditions: belief, truth, and justification [12].

Gettier's problem demonstrates that these criteria, while necessary, may not suffice for genuine knowledge, prompting ongoing debate about traditional epistemic conditions [12]. Contemporary epistemology has consequently shifted toward intersubjective approaches, arguing that knowledge need not be devoid of subjectivity but should undergo critical scrutiny, peer review, and intersubjective validation to ensure epistemic robustness [8]. Critics may argue that intersubjectivity merely distributes subjectivity rather than eliminating it, but in [8] the model of "transformative critique" illustrates how structured peer review—exemplified by interdisciplinary panels like AI ethics councils—can mitigate this risk by holding participants accountable to shared epistemic standards [13,14].

4. Findings and Implications

The analysis of objectivity, subjectivity, and epistemological neutrality reveals that absolute objectivity is unattainable due to the influence of cognitive structures, sociocultural contexts, and theoretical paradigms. However, this does not imply epistemic relativism; rather, intersubjectivity provides a structured alternative for knowledge validation. Philosophers such as Kuhn, Popper, Longino, and Habermas offer insights into how knowledge is shaped, revised, and legitimised within epistemic communities.

These findings have significant implications for contemporary debates on epistemic authority, particularly in fields where human cognition interacts with technological systems. The intersubjective validation of knowledge is especially critical in domains where tacit knowledge, interpretative frameworks, and contextual understanding shape decision-making. This paper now applies these insights to Complex Domains of Informal Structure (CDIS), examining how knowledge formation occurs in environments characterised by epistemic uncertainty and emergent complexity.

These insights hold significant implications for disciplines where knowledge production involves multiple perspectives, such as artificial intelligence, economic modelling, and decision-making systems. In these fields, knowledge is not only constructed but also actively negotiated among specialists who interpret reality through different conceptual lenses. This challenge is particularly evident in CDIS, where the integration of unstructured, tacit knowledge requires methodological strategies that can manage epistemic uncertainty while preserving the integrity of expert-driven insights. The following section intertwines the topic of epistemological neutrality with Complex Domains, pointing out how methodologies such as KMoS-SSA facilitate the structured management of knowledge in inherently subjective domains.

5. Complex Domain of Informal Structure: Characteristics, Challenges and Approaches to its Management

CDIS hold dual significance for this paper. Primarily, CDIS constitutes an environment where epistemological neutrality faces intrinsic challenges. Additionally, this concept is fundamental to cognitive architecture, particularly in developing solutions to problems or necessities within these complex domains [15]. A cognitive solution addresses these challenges using available CDIS knowledge, often through AI tools specifically designed for this purpose.

A CDIS is defined as a knowledge field lacking a formal structure for organising, systematising, and communicating information. This absence complicates knowledge analysis, management, and interpretation, as it depends heavily on context and is characterised by heterogeneous information, prevalent tacit knowledge [16], and dynamic complexity. According to [17], CDIS features unstructured, context-dependent knowledge that resists rigid categorisation, hindering analysis and transfer. Information derives from diverse sources—personal experiences, structured and unstructured data, and specialised tacit knowledge—creating interpretative complexity that varies with the application context.

Tacit knowledge occupies a central position in CDIS as the foundation for cognitive solution development. Its management presents significant challenges; although domain specialists possess this knowledge, its intuitive and practical nature resists articulation and documentation. Built upon accumulated experience, intuition, and developed skills, tacit knowledge is essential for domain understanding but particularly difficult to capture and transfer. In [17], it is stated that tacit knowledge always contains elements that defy full explanation and thus require special management strategies.

Complexity and dynamism further characterise CDIS environments. These domains evolve continuously, rapidly changing information and knowledge due to source diversity, variable data quality, and multidisciplinary integration requirements. This fluid nature demands adaptive approaches capable of managing inherent uncertainty and ambiguity.

Addressing CDIS challenges requires systemic approaches that integrate knowledge management with adaptive methodologies. The KMoS-SSA (Knowledge Management of Strategic Options through Soft Systemic Analysis) framework exemplifies this approach, combining knowledge management principles with systemic analysis to develop effective cognitive solutions in complex domains. This methodology facilitates information heterogeneity management, tacit knowledge integration, and adaptation to environmental dynamism [17].

In summary, CDIS is characterised by information heterogeneity, contextual dependence, tacit knowledge prevalence, complexity, and dynamism—requiring systemic management approaches. While presenting significant knowledge management challenges, these domains offer substantial opportunities for innovation and cognitive solution development across medicine, engineering, education, and smart cities. Methodologies like KMoS-SSA improve knowledge management in these domains, enabling more informed and effective decision-making.

5.1. Knowledge in Complex Domains of Informal Structure

There are significant differences between knowledge as addressed within the framework of epistemological neutrality and knowledge as it manifests within Complex Domains of Informal Structure (CDIS). While both share fundamental characteristics—such as the ability to process information and facilitate decision-making—their origins, methods of acquisition, representation, and application differ considerably. The primary distinctions are outlined below:

(1) **Knowledge Representation**: A foundational aspect of cognitive solutions, knowledge representation enables the effective processing, interpretation, and utilisation of information. Various representational models exist, including formal logic, semantic networks, ontologies, production rules, frames, probabilistic models, decision trees, numerical vectors, knowledge graphs, case bases, textual or graphical representations, and self-organising maps. Irrespective of the chosen format, all representations must provide context and meaning, ensuring that the information processed is both interpretable and actionable. Effective representation is indispensable for cognitive solutions to address and resolve challenges within CDIS.

(2) **Domain Knowledge**: This pertains to an in-depth understanding of a specialised field, allowing for the formulation of pertinent inquiries and the selection of optimal tools for analysis. Domain knowledge is crucial for interpreting results accurately and applying them effectively in real-world contexts.

(3) **Integration of Theory and Experience**: Knowledge emerges through the synthesis of theoretical constructs and empirical validation. The interplay of these elements enables cognitive solutions to evolve and refine their efficacy as new insights and data are assimilated.

(4) **Reasoning**: Some cognitive solutions employ

advanced reasoning methodologies that leverage represented knowledge. This process extends beyond the mere utilisation of explicit information, fostering the generation of connections between seemingly disparate facts, thereby enhancing interpretative and analytical capacities.

(5) **Contextual Relevance**: The applicability of knowledge is inherently contingent upon the context in which it is deployed. What is considered valuable in one scenario may be irrelevant in another, underscoring the necessity of adapting information and insights to specific circumstances.

(6) **Practical Application**: Knowledge attains its full significance when it informs decision-making, directly resolves problems, or fulfils well-defined needs. In the realm of CDIS, the integration of pre-existing domain knowledge enhances the efficacy of cognitive models, fortifying their alignment with real-world complexities.

In essence, knowledge transcends the mere organisation of information; it embodies the assimilation, comprehension, and strategic application of that information across varied contexts. While information constitutes structured data that conveys meaning, knowledge introduces an additional dimension of interpretation and experiential depth, facilitating its transformation into concrete and purposeful action. It is this dynamic capacity for processing and application, directed towards specific objectives, that renders knowledge an indispensable asset both for human cognition and for cognitive solutions [18].

To conclude this subsection, it is important to emphasise that these principles are not limited to theoretical abstraction. Indeed, the application of frameworks such as KMoS-SSA has a demonstrable impact in real-world settings. The following examples of CDIS are worthy of consideration:

Healthcare decision-making: A multidisciplinary team responsible for the management of a patient with cancer will analyse radiological data, genetic markers, patient preferences, and comorbidity profiles. Much of the expertise—for example, a surgeon's tactile sensitivity about the operability of a tumour or an oncologist's intuition about tolerance to chemotherapy—resides in tacit form. The utilisation of KMoS-SSA facilitates the acquisition of knowledge and the provision of diverse contributions to a collaborative decision-making process. This approach employs structured dialogue and scenario building to manage subjectivity, thereby supporting the integration of evidence-based protocols with empirical knowledge.

Urban planning: The design of public transport systems for metropolitan areas necessitates the integration of data pertaining to traffic flow, urban demographics, citizen opinions, environmental priorities and political feasibility. These perspectives are context-bound and frequently contradictory. The application of KMoS-SSA enables planners to capture the tacit knowledge of specialists, simulate urban growth models and iteratively refine transport proposals through intersubjective validation in interdisciplinary workshops.

Education policy: In the process of reforming the curriculum with a view to reducing inequalities, educators, policymakers, parents and students contribute knowledge from a variety of perspectives that are both different and sometimes contradictory. KMoS-SSA collects the experience of frontline teachers, the cultural context of students, and statistical trends in learning outcomes, and can turn this heterogeneous corpus into an adaptable policy prototype that is subject to collective scrutiny.

5.2. Differences Between Knowledge in Epistemological Neutrality and Knowledge in CDIS

There are significant differences between knowledge as addressed within the framework of epistemological neutrality and knowledge as it manifests within Complex Domains of Informal Structure (CDIS). While both share fundamental characteristics—such as the ability to process information and facilitate decision-making—their origins, methods of acquisition, representation, and application differ considerably (e.g., **Figure 1**).

The primary distinctions are outlined below:

(1) **Origin of Knowledge**: Human knowledge, often explored within the context of epistemological neutrality, emerges from direct experience, social learning, formal and informal education, intuition, and reflective thought. It is cumulative, shaped by emotions, cultural values, and personal contexts, encompassing both explicit knowledge (which can be articulated) and tacit knowledge (which remains difficult to express). In contrast, knowledge within a CDIS is predominantly composed of explicit knowledge derived

from the tacit expertise of human specialists, made explicit through structured processes. It also encompasses structured and unstructured data, which are collected, processed, and modelled using algorithms. Unlike human knowledge, it lacks an intuitive or emotional genesis, relying exclusively on the data provided. Moreover, it does not possess genuine tacit knowledge, as all insights must be formally represented or inferred through statistical correlations.

(2) **Form of Representation**: Human knowledge is inherently flexible and multimodal, encompassing language, mental imagery, emotions, physical sensations, and abstract associations. This rich tapestry allows for implicit understanding and deep contextual influence. In contrast, knowledge in CDISs is confined to formal, structured models such as metadata, knowledge graphs, and numerical vectors. These representations are explicitly defined to facilitate computational processing but lack the nuanced ambiguity and subjective depth inherent in human cognition. Consequently, while human knowledge thrives on implicit connections and context, CDIS knowledge relies on precise, explicit data structures that struggle to capture the full spectrum of human understanding.

(3) **Capacity for Generalisation**: Human beings naturally generalise concepts and apply them to novel situations, even when information is incomplete. Creativity and intuition enable innovative problem-solving and adaptation to unexpected circumstances. By contrast, CDIS knowledge excels at identifying patterns within its training data but struggles with extrapolation beyond those confines. Cognitive models frequently fail when confronted with problems outside their designated domain or when data is insufficient or ambiguous.

(4) **Contextual Adaptability**: Humans interpret knowledge contextually and can refine their understanding based on social, emotional, and environmental variables. They engage in continuous learning and dynamically adapt to evolving situations. In CDIS, knowledge lacks an intrinsic grasp of context. Its interpretation is dictated by model design and the data on which it was trained. While some advanced systems can simulate limited adaptability—such as reinforcement learning—their responses remain predictable and constrained.

(5) **Creativity and Innovation**: Human cognition fosters authentic creativity, enabling the generation of original ideas, artistic expression, and innovative solutions that intertwine emotions, experiences, and tacit insights in unique ways. Cognitive solutions within CDIS may simulate creativity by producing content derived from learned patterns (e.g., text generation, musical composition, or visual design). However, they lack genuine originality, as their outputs are always contingent on pre-existing data, information, and algorithmic processes.

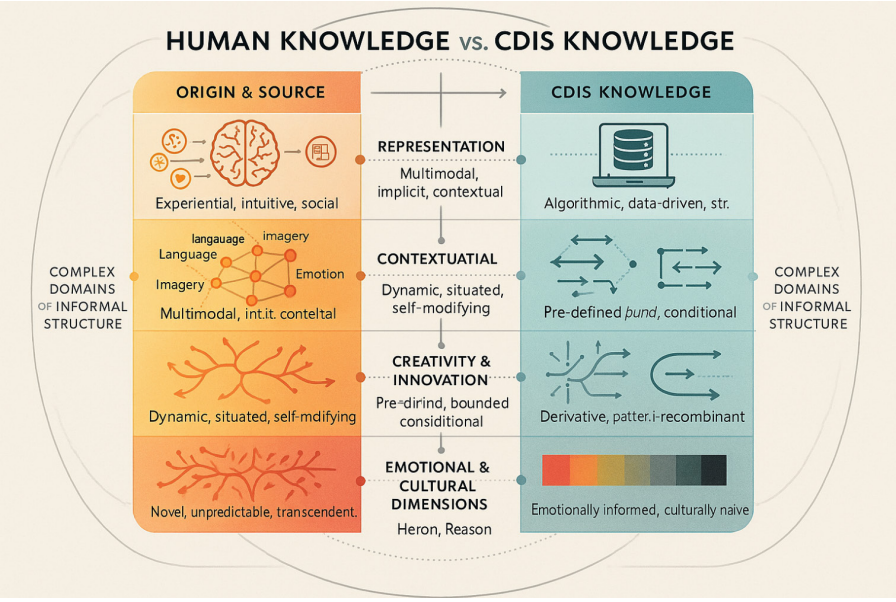

Figure 1. Comparative Analysis of Human Knowledge and CDIS Knowledge Across Five Fundamental Dimensions. This Diagram Illustrates the Qualitative Differences in Origin, Representation, Adaptability, Creativity, and Emotional-Cultural Capacity Between These Knowledge Systems.

(6) **Emotions and Values**: Emotions and values are integral to human knowledge acquisition, interpretation, and application. Human decision-making is often influenced by ethical principles, empathy, and moral judgement. In CDIS, cognitive solutions lack inherent emotions or values. While they may incorporate prior deterministic ethical constraints, these are not the result of genuine moral reasoning. Instead, AI-based decisions are strictly rational and data-driven, devoid of subjective or emotional considerations.

(7) **Emotional and Cultural Dimensions**: Recent research in cognitive science demonstrates that emotions constitute fundamental components of reasoning, judgement, and decision-making [19]. Damasio's work on somatic markers illustrates how emotional processing provides essential guidance in complex decision situations, particularly under conditions of uncertainty [20]. Similarly, human knowledge is embedded within cultural frameworks that shape perception, categorisation, and interpretation at fundamental levels. Cross-cultural studies reveal how cultural orientations influence attention patterns and conceptual organisation [21]. The CDIS framework must therefore account for these dimensions, particularly in domains where cross-cultural collaboration is essential.

(8) **Embodied Knowledge**: The experiential embodiment of human knowledge constitutes another crucial aspect often overlooked in traditional epistemology. As Polanyi demonstrates [16], expertise develops through embodied experience that integrates sensory, motor, and cognitive dimensions. This becomes particularly evident in domains requiring refined perceptual discrimination or physical skill. The situated, embodied nature of human knowing resists full formalisation precisely because it is grounded in lived experience rather than abstract representation.

(9) **Limitations and Biases**: Humans are susceptible to cognitive biases and perceptual distortions but possess the capacity for self-reflection and error correction. Experience and continuous learning enable them to mitigate mistakes and refine judgement over time. CDIS knowledge, however, inherits biases present in its training data, potentially leading to systematic errors and discriminatory outcomes. Unlike humans, cognitive models lack awareness of their biases and cannot independently reassess their assumptions.

(10) **Continuous Learning**: Humans engage in lifelong learning, integrating new information dynamically with prior knowledge. This process is organic, curiosity-driven, and guided by intrinsic cognitive goals. In contrast, CDIS knowledge requires explicit updates or retraining to incorporate new information. While techniques such as continuous learning attempt to address this limitation, they remain significantly constrained compared to human adaptability.

(11) **Social Interaction**: A substantial portion of human knowledge is cultivated through social interaction, dialogue, and collaborative engagement. Human communication encompasses nuances such as tone, body language, and cultural context, enriching the transmission and interpretation of knowledge. While cognitive solutions can engage with humans via natural language processing, they lack true comprehension of social interactions. Their conversational abilities remain limited due to their inability to grasp empathy, deeper meaning, and complex contextual cues.

Human knowledge is inherently deep, contextually nuanced, adaptable, and emotionally enriched. By contrast, knowledge within a CDIS is structured, data-driven, and highly specialised yet lacks the depth of creativity, contextual awareness, and intrinsic ethical reasoning that characterises human cognition. Despite these limitations, the integration of both types of knowledge offers immense potential in domains such as decision-making, automation, and complex problem-solving. However, it is imperative to acknowledge the inherent constraints of CDIS and avoid overestimating its capacity to fully replicate the intricacies of human knowledge.

5.3. Replication in Complex Domains of Informal Structure

Imagine a master chef with decades of experience who can adjust seasonings by taste alone, compared to an AI-chef following precise recipes. Although both might produce excellent dishes, they represent fundamentally different approaches to the "know-how" of cooking. The AI can replicate certain aspects of the chef's knowledge—following procedures and measuring ingredients—but cannot truly replicate the chef's intuitive understanding developed through years of embodied experience. This illustration

encapsulates the central concern of this section: the nature and limitations of replication in Complex Domains of Informal Structure.

As we shall examine, replication in CDIS refers to a cognitive solution's capacity to simulate, imitate, or reproduce specific aspects of human cognition, behaviour, or information processing within defined parameters. The chef analogy highlights a critical distinction that undergirds our subsequent analysis: **replication constitutes a functional approximation rather than a complete reproduction of human knowledge**. This distinction becomes increasingly significant as we consider the various dimensions of replication detailed below.

The following breakdown outlines the various nuances of replication:

(1) **Simulation of Cognitive Processes**

- **Definition**: AI can replicate certain human cognitive processes when performing tasks that involve reasoning, analysis, or decision-making [22].
- **Example**: An AI-based medical diagnostic system can analyse radiological images and suggest possible diseases, akin to the diagnostic reasoning employed by a human doctor.
- **Limitation**: Although AI can simulate these processes, it lacks the deep understanding, intuition, and contextual awareness that a human doctor applies when interpreting medical results [23].

(2) **Imitation of Results**

- **Definition**: AI can generate outputs that closely resemble those produced by humans for specific tasks [24].
- **Example**: A language model such as GPT can compose a coherent essay or respond to complex queries in a manner that appears indistinguishable from human writing.
- **Limitation**: While AI can mimic cognitive processes like diagnostic reasoning, it lacks the deeper understanding, intuition, and contextual sensitivity of human experts. Similarly, AI-generated outputs—though coherent—are devoid of comprehension, intention, or emotional insight.

(3) **Pattern Reproduction**

- **Definition**: AI can identify, and replicate patterns present in large datasets, thereby mimicking human behaviour or decision-making based on statistical correlations [25].
- **Example**: A film recommendation system suggests movies based on a user's past preferences, much like a friend would recommend films based on personal knowledge of one's tastes.
- **Limitation**: AI relies solely on available data and cannot incorporate subjective interpretation or contextual subtleties that a human would naturally consider.

(4) **Automation of Specific Tasks**

- **Definition**: AI can replicate human task execution, particularly for repetitive or rule-based processes [26].
- **Example**: An industrial robot can assemble products on a production line as efficiently as a human worker.
- **Limitation**: AI is confined to pre-programmed tasks and struggles with adaptability when faced with unforeseen circumstances outside its defined operational scope.

(5) **Data-Based Knowledge Generation**

- **Definition**: AI can generate insights based on data analysis, thereby approximating the human ability to extract meaningful information from vast datasets [27].
- **Example**: A financial analysis system can predict market trends using historical data, much like a human analyst identifying investment opportunities [25].
- **Limitation**: AI-generated knowledge is bound by the data and algorithms at its disposal; it lacks the creativity, intuition, and inferential reasoning that a human expert applies in making decisions.

(6) **Limited Social Interaction**

- **Definition**: AI can mimic basic human interactions through natural language processing and automated response mechanisms.
- **Example**: A chatbot can engage in scripted conversations, respond to frequently asked questions, and provide customer support.
- **Limitation**: AI lacks true emotional intelligence, intentionality, and cultural awareness, which constrains its ability to engage in complex or mean-

ingful social interactions [28,29].

Therefore, **to replicate human cognition within CDIS means that AI can imitate or simulate certain aspects of human knowledge within specific, well-defined parameters**. However, replication remains **an approximation rather than an exact reproduction**, and AI lacks the intrinsic depth, contextual awareness, and creative adaptability inherent to human cognition. While AI can be an **indispensable tool for augmenting human decision-making and problem-solving**, it fundamentally serves as a **complementary rather than a substitutive** form of intelligence.

5.4. In What Situations Can AI fully Replicate Human Knowledge?

The advancement of artificial intelligence (AI) in recent decades is widely recognised, and in certain specific contexts, it can indeed replicate aspects of human knowledge. However, it is crucial to emphasise that AI cannot fully replicate human knowledge in its entirety, owing to the fundamental differences in how humans and machines acquire, process, and apply information (as discussed above). Nonetheless, there are instances in which AI can simulate or replicate specific facets of human knowledge with notable accuracy. Some of these instances are outlined below:

(1) **Repetitive and Rule-Based Tasks**

- **Situation**: Well-defined, structured, and repetitive tasks.
- **Example**: Processing administrative data, performing complex mathematical calculations, or analysing large datasets.
- **Why AI Works**: AI operates effectively in these scenarios because it can follow predefined rules and recognised patterns without experiencing fatigue or human error. In these tasks, human knowledge is also limited to explicit rules, which facilitates AI's replication, as noted in [26].

(2) **Classification and Pattern Recognition**

- **Situation**: The identification of patterns in large datasets, such as images, text, or signals.
- **Example**: Medical diagnostics using images (e.g., X-rays, MRIs), facial recognition, or spam detection in emails.
- **Why AI Works**: Leveraging deep learning techniques, AI can analyse vast quantities of data, identifying subtle patterns that might elude human perception. While humans also rely on pattern recognition, AI can accomplish this more rapidly and at a larger scale, as discussed by [23,25].

(3) **Data-Driven Decision Making**

- **Situation**: Decisions are grounded entirely in objective data and quantifiable metrics, as described by [25,26].
- **Example**: Optimisation of transport routes, personalised recommendations on streaming platforms (e.g., Netflix, Spotify), or financial forecasting.
- **Why AI Works**: AI can process extensive datasets in real-time and make decisions based on predefined algorithms. Here, human knowledge would similarly be restricted to interpreting data, allowing AI to operate with equal or superior efficiency.

(4) **Simulation of Specialised Knowledge**

- **Situation**: Areas where human knowledge is highly specialised and technical.
- **Examples**: Medical assistants for preliminary diagnoses, legal support systems for analysing legal documents, or automatic translation tools.
- **Why AI Works**: AI can access vast databases of prior knowledge and apply logical rules to simulate the reasoning of human specialists. Although AI lacks a deep understanding of the subject matter, it can replicate specialist-level outcomes in specific contexts, as noted in the works by [22,27].

(5) **Pattern-Based Content Generation**

- **Situation**: Creation of content that adheres to predictable patterns or specific styles, as discussed by [23,24].
- **Example**: Generation of text (e.g., articles, essays, emails), musical compositions, or basic graphic designs.
- **Why AI Works**: AI can analyse vast volumes of human-generated content and produce outputs that mimic existing styles and structures. While it lacks genuine creativity, it can generate content that appears "human" within defined contexts.

(6) **Limited Interaction with Humans**

- **Situation**: Simple, predictable interactions between humans and machines.

- **Examples**: Chatbots for customer service, virtual assistants (such as Siri or Alexa), or automated response systems.
- **Why AI Works**: In these scenarios, AI can handle interactions based on scripted dialogues or natural language patterns, particularly when conversations are constrained and foreseeable, as reflected in [28,29]. Here, human knowledge is similarly restricted to standardised responses.

(7) **Prediction in Controlled Systems**

- **Situation**: Predictions within environments where the variables are known and controlled.
- **Example**: Weather forecasting, scientific simulations, or risk analysis in engineering, as discussed in [27].
- **Why AI Works**: AI excels in modelling complex systems using historical data and advanced algorithms, as indicated in [25]. In these contexts, human knowledge is also reliant on mathematical and statistical models, allowing AI to achieve comparable or even superior accuracy.

5.5. Limitations of AI in Replicating Human Knowledge

Despite the examples, there remain domains where AI is not yet capable of fully replicating human knowledge.

(1) **Deep and Contextual Understanding**: AI lacks a true understanding of context and underlying meaning. For instance, while AI can translate languages, it cannot grasp the emotional or cultural nuances inherent in words, as observed in [28,29].

(2) **Genuine Creativity**: While AI can generate content based on patterns [24], it cannot innovate or create something truly original outside the scope of the data it has been trained on, as noted by Lake [23].

(3) **Tacit Knowledge**: Many human abilities, such as driving a car in unpredictable conditions or interpreting emotions during conversations, depend on tacit knowledge that is difficult for machines to encode, as discussed in [28,29].

(4) **Ethical and Moral Judgement**: AI lacks intrinsic ethical values and relies on external programming to address moral dilemmas. This can lead to inappropriate decisions in complex situations, as noted in [28,29].

(5) **General Adaptability**: Humans can adapt swiftly to new environments or unforeseen challenges, while AI is limited to the domains in which it has been trained, as reflected in [23,28].

About replicating, it is concluded that AI can replicate specific aspects of human knowledge in well-defined situations, particularly in structured tasks, data-driven processes, or those that follow predictable patterns. However, in domains demanding deep understanding, creativity, empathy, ethical judgement, or general adaptability, AI does not yet match the breadth of human capabilities. In short, AI serves as a powerful tool for complementing and amplifying human knowledge, but it cannot entirely replace it in all its complexity.

6. The Problem of Epistemological Neutrality of Knowledge Framed by a Complex Domain of Informal Structure

6.1. Thesis

Human knowledge invariably bears the imprint of subjective mediation through its producer and interpreter. Rather than pursuing an elusive absolute objectivity, intersubjectivity and critical scrutiny provide more reliable frameworks for knowledge validation.

6.2. Arguments

The critique of epistemological neutrality proceeds through a four-part logical progression:

6.2.1. The Conceptual Impossibility of Pure Objectivity

It is important to consider how our understanding of mental health has evolved over the centuries. The concept previously ascribed to “humours”, or “moral defects” is now understood through psychological and neurobiological frameworks. This paradigm shift unveils a profound philosophical insight: the concept of “objective reality” is inherently subject to filtration through conceptual lenses, which are shaped by the historical and cultural circumstances of the perceiving individual. The following analysis examines how philosophers, from Kant to Wittgenstein, have sys-

tematically demonstrated that our understanding is always mediated by cognitive structures and social practices. This makes the ideal of pure, unfiltered access to reality–what is termed "pure objectivity"–fundamentally unattainable. This does not entail the abandonment of the pursuit of reliable knowledge; rather, it necessitates a reconceptualisation of the validation of claims to knowledge.

Epistemology, particularly within scientific discourse, has traditionally valorised objectivity as knowledge's ultimate goal. Kant, however, recognised that our perception of reality is filtered through a priori cognitive structures, fundamentally challenging pure objectivity's possibility. Popper attempted to address this through falsifiability, requiring scientific theories to be empirically refutable, yet the selection of theories for investigation and their interpretation remains subject to contextual influences.

Kuhn further challenged objectivity by demonstrating how scientific knowledge evolves through paradigmatic revolutions, with socio-culturally shaped paradigms determining legitimate knowledge within specific historical moments. Wittgenstein's analysis of language games revealed how our conception of objectivity itself is constructed through linguistic and social practices, highlighting the inescapable influence of social structures on our understanding of reality [30].

6.2.2. The Positive Case for Intersubjectivity

Given pure objectivity's limitations, intersubjectivity emerges as a structured mechanism for knowledge validation. Unlike approaches seeking a supposedly neutral epistemic standpoint, intersubjective processes integrate critical discourse, peer evaluation, and collective scrutiny to mitigate individual biases. In [8], it is argued that scientific knowledge develops optimally through socially mediated criticism, where diverse perspectives enhance epistemic robustness. This approach distributes rather than eliminates subjectivity, acknowledging knowledge's contextual foundations while improving its reliability through collective scrutiny.

The logical structure of this argument can be formalised as follows:

(1) If absolute objectivity is unattainable, then knowledge validation requires alternative frameworks;

(2) Absolute objectivity is unattainable (as demonstrated in 6.2.1);

(3) Therefore, knowledge validation requires alternative frameworks;

(4) Intersubjective frameworks offer structured processes for knowledge validation without requiring absolute objectivity;

(5) Therefore, intersubjective frameworks provide a viable alternative for knowledge validation.

6.2.3. The Practical Consequences of False Neutrality Claims

The objectivity question has profound implications across multiple domains. In science, objectivity claims can obscure biases in hypothesis selection, data interpretation, and research funding [5]. In politics, ostensibly objective positions frequently mask ideological interests and subjective values [31]. In Artificial Intelligence, algorithms presented as objective inevitably incorporate biases from their training data and designers' perspectives.

In [10], it is demonstrated how algorithmic decision-making can perpetuate systemic biases when trained on historically biased datasets, while Boden notes AI systems lack the contextual awareness necessary for genuinely neutral judgment [29]. These examples illustrate how epistemic subjectivity permeates even our most sophisticated technological frameworks.

The practical consequences of false neutrality claims can be demonstrated through the following syllogism:

(1) If knowledge claims are presented as neutral when they are not, hidden biases operate without scrutiny

(2) Many scientific, political, and technological knowledge claims are presented as neutral when they are not

(3) Therefore, hidden biases operate without scrutiny in many scientific, political, and technological domains

(4) Unscrutinized biases lead to perpetuated inequalities and epistemic distortions

(5) Therefore, false neutrality claims perpetuate inequalities and epistemic distortions

6.2.4. The Application to Complex Domains of Informal Structure

Within CDIS, knowledge is inherently contextualised and shaped by specialists' perspectives and experiences [17]. This context-dependency further demonstrates the impos-

sibility of fully objective knowledge. To address this limitation, CDIS emphasises collaborative and intersubjective processes for knowledge validation, aligning with Latour and Woolgar's observation that scientific knowledge advances through epistemic community negotiations [7].

Frameworks such as KMoS-SSA employ methodologies that foster interaction among diverse specialists, managing knowledge disputes and minimising individual biases through collaborative approaches. These methodologies acknowledge subjectivity while establishing shared epistemic standards, offering practical alternatives to the unattainable goal of absolute objectivity.

Simon reinforces this critique by demonstrating how complex system decision-making necessarily involves heuristics and adaptation [32]. Knowledge validity extends beyond formal data to include contextual applicability, experiential factors, and epistemic community power dynamics. This reveals how both subjective elements and practical necessities influence decision-making in complex domains, further undermining the possibility of achieving truly objective understanding.

The application to CDIS is structured in a logical manner, as illustrated below:

(1) In the context of a domain characterised by tacit knowledge and specialist interpretation, the claim of epistemic neutrality is particularly resisted.

(2) CDIS is characterised by tacit knowledge and specialist interpretation.

(3) Therefore, CDIS is not inclined to accept the claim of epistemic neutrality.

(4) In the event of a domain exhibiting a marked resistance to the notion of epistemic neutrality, it becomes imperative to implement an explicit management strategy for subjectivity.

(5) Therefore, CDIS necessitates the explicit management of subjectivity.

(6) Intersubjective frameworks such as KMoS-SSA provide an explicit management of subjectivity.

(7) It can thus be concluded that intersubjective frameworks such as KMoS-SSA are especially well-suited to the field of CDIS.

The question must therefore be posed: how could there be a step-by-step of explicit subjectivity management by KMoS-SSA?

The following case study is provided for illustrative purposes: The management of epistemic subjectivity in the medical diagnosis of early-stage Alzheimer's disease is a complex problem embedded in a complex domain. The symptoms of this condition are often subtle and overlap with other neurological conditions (e.g., **Figure 2**).

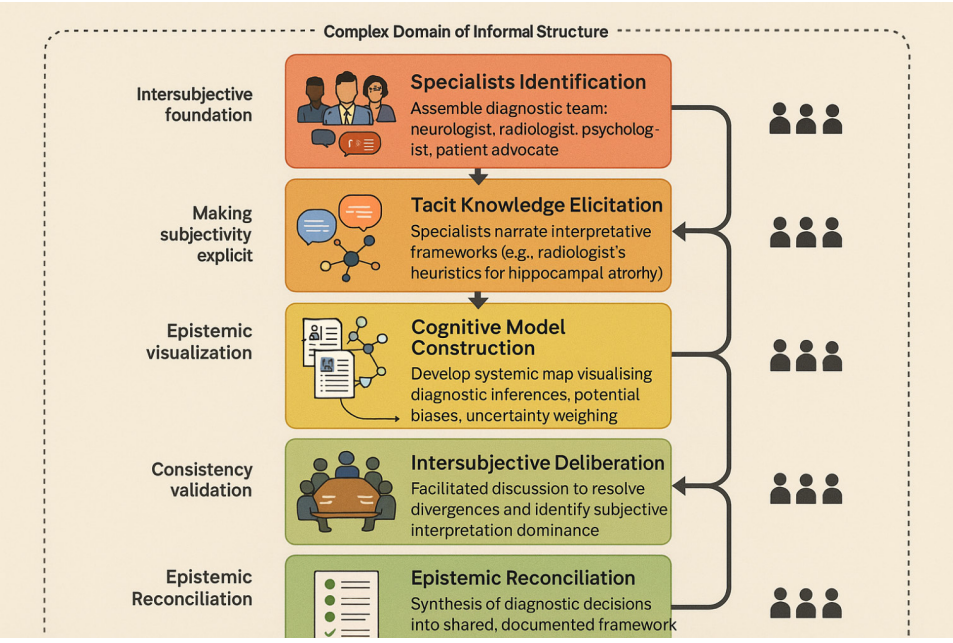

Figure 2. The Six-Step of Explicit Subjectivity Management by KMoS-SSA Applied to Early-Stage Alzheimer's Diagnosis, Illustrating How Intersubjective Epistemology Is Operationalised in Clinical Practice. This Process Demonstrates the Disciplined Transformation of Subjective Knowledge into Collectively Validated Diagnostic Frameworks.

In this domain, the utilisation of a structured intersubjective framework–such as the KMoS-SSA–can be achieved in the following manner:

- The **initial step** in the process is the identification of the relevant specialists. The diagnostic team should comprise a neurologist, a radiologist, a psychologist, a patient advocate and, moreover, an artificial intelligence diagnostic tool.
- The **second step** in the process is the elicitation of tacit knowledge. In this step, each specialist narrates their interpretative framework. For example, a radiologist might narrate their heuristics for interpreting hippocampal atrophy, while a psychologist might describe the behavioural patterns that they find trigger.
- **Thirdly**, cognitive models are constructed. Utilising the aforementioned inputs, a systemic map is formulated to visualise the manner in which diagnostic inferences are made, the potential entry of biases, and the weighing of uncertainties.
- The **fourth step** of the process is Scenario Analysis. In this step, the team simulates multiple patient profiles. The objective of this is to test whether the diagnostic process remains consistent. The AI tool, such as a Large Language Model (LLM), is prompted to offer parallel analysis, and disagreements are examined.
- The **fifth step** in the process is intersubjective deliberation. This is a facilitated discussion that is used to resolve disagreements and identify instances where subjective interpretations dominate. One example of this might be determining whether memory loss is deemed to be clinically significant.
- The **last step** of the process is epistemic reconciliation, which involves bringing together all of the relevant diagnostic decisions into a shared, documented framework. This process highlights the parts for whom subjective judgment was exercised and the reasoning behind the reached consensus.

This stepwise process demonstrates how epistemic subjectivity is not eliminated, but rather disciplined, clarified, and transformed into collectively validated knowledge.

6.2.5. Perspectives from Contemporary Philosophy

Contemporary philosophers have greatly enriched the debate on epistemological neutrality. Their contributions reveal key tensions between the claim to objectivity and the inescapability of subjectivity:

- **Chomsky** and **Williamson** maintain that objective knowledge remains attainable through systematic methodologies despite acknowledging subjective influences [33,34].
- **Žižek** and **Marion** argue that reality perception is inevitably mediated through ideological structures and consciousness, making pure objectivity impossible [35,36].
- **Gabriel** (2015) and **Meillassoux** (2008) propose nuanced forms of realism, suggesting that objective facts exist independently of interpretation, although our access remains conditioned by cognitive structures [37,38].
- **Habermas** (1991) and **Nussbaum** (2001) emphasise intersubjective communication and critical deliberation as means to validate knowledge and evaluate beliefs [31,39].
- **Cartwright** (1983) and **McDowell** (1996) demonstrate how scientific laws and perceptual experience are necessarily mediated by models and conceptual frameworks [40,41].
- **Nagel** acknowledges the challenge of attaining a completely objective perspective—his "view from nowhere"—while **Badiou** suggests that objectivity remains provisional, with truth emerging through disruptive events [2,42].

These Western perspectives, despite their differences, converge on recognising both the value of epistemic rigour and the inescapable role of subjectivity in knowledge production.

However, epistemological inquiry transcends Western philosophical traditions. Eastern philosophical perspectives have long engaged with questions of objectivity, knowledge and truth, offering complementary insights that further strengthen the case for intersubjective frameworks.

- **Buddhist Epistemology**, particularly in the Madhyamaka tradition articulated by **Nāgārjuna**,

offers a sophisticated critique of both absolutism and nihilism through the concept of śūnyatā (emptiness) and the theory of dependent origination. Nāgārjuna's Middle Way philosophy rejects the notion of svabhāva (inherent existence), maintaining that phenomena lack independent essence and exist only through their relations to other phenomena [43]. This perspective resonates with our critique of absolute objectivity and suggests an epistemology that is inherently intersubjective, as knowledge claims derive their meaning and validity through contextual relations rather than correspondence to ultimate reality.

- **Japanese Philosophy**, particularly as developed by **Kitarō Nishida** and the Kyoto School, provides another valuable perspective through the concept of "basho" (place) as the foundation of knowledge. Nishida's logic of place (basho no ronri) suggests that knowledge emerges not from a subject-object dichotomy but from a field of interrelationality in which the knower and the known co-constitute each other [44]. This perspective aligns remarkably with the intersubjective frameworks advocated in this paper, where knowledge validation occurs through structured communal processes.
- **Confucian Epistemology** approaches knowledge primarily as moral and practical wisdom (智 , zhì) rather than abstract theoretical truth. Knowledge in the Confucian tradition is inseparable from virtue and social context, as articulated in texts such as the Analects and the Great Learning [45]. This tradition's emphasis on the social nature of knowledge anticipates contemporary intersubjective approaches and offers a corrective to the Western tendency to individualise knowledge acquisition. The Confucian concept of rectification of names (正 名 , zhèngmíng) further suggests that proper knowledge requires aligning concepts with social realities and ethical considerations.

The integration of these Eastern and Western philosophical traditions enriches our understanding of intersubjectivity in several ways. First, it demonstrates that the critique of absolute objectivity reflects broader philosophical insights across diverse cultural contexts rather than merely responding to Western philosophical problems. Second, Eastern traditions often embrace paradox and complementarity rather than rigid dichotomies, providing conceptual resources for transcending the objectivity-subjectivity divide. Third, many Eastern philosophical approaches emphasise the contextual, relational and practical dimensions of knowledge in ways that complement Western intersubjective frameworks.

When brought into dialogue with discussions of knowledge in Complex Domains of Informal Structure, these diverse philosophical traditions suggest that the movement toward intersubjective frameworks represents not merely a pragmatic adaptation to complexity but a profound philosophical insight into the nature of knowledge itself. The convergence of these varied traditions on the contextual and relational nature of knowledge lends robust support to the intersubjective approaches advocated throughout this paper.

6.3. Extended Epistemology and the Human Dimension of Intersubjective Knowledge

The critique of epistemological neutrality advanced thus far requires complementing with an expanded conception of knowledge that acknowledges its multi-dimensional human character. Of particular relevance is Heron and Reason's extended epistemology model (e.g., **Figure 3**), which delineates four interdependent ways of knowing that function within complex domains [1].

This sophisticated model identifies four distinct yet interconnected types of knowledge:

- **Experiential knowing**: direct encounter, feeling and resonance with phenomena.
- **Presentational knowing**: expression through narrative, imagery and aesthetic forms.
- **Propositional knowing**: conceptual formulations and theoretical frameworks.
- **Practical knowing**: skill, competence and tacit understanding.

As Reason astutely observes, "Propositional knowing draws on concepts and ideas, making sense of and maybe generalising from experience... although propositional knowing always carries the danger of creating a world that exists in its own conceptual bubble, it is also clear that new ideas can drive everyday life" [1].

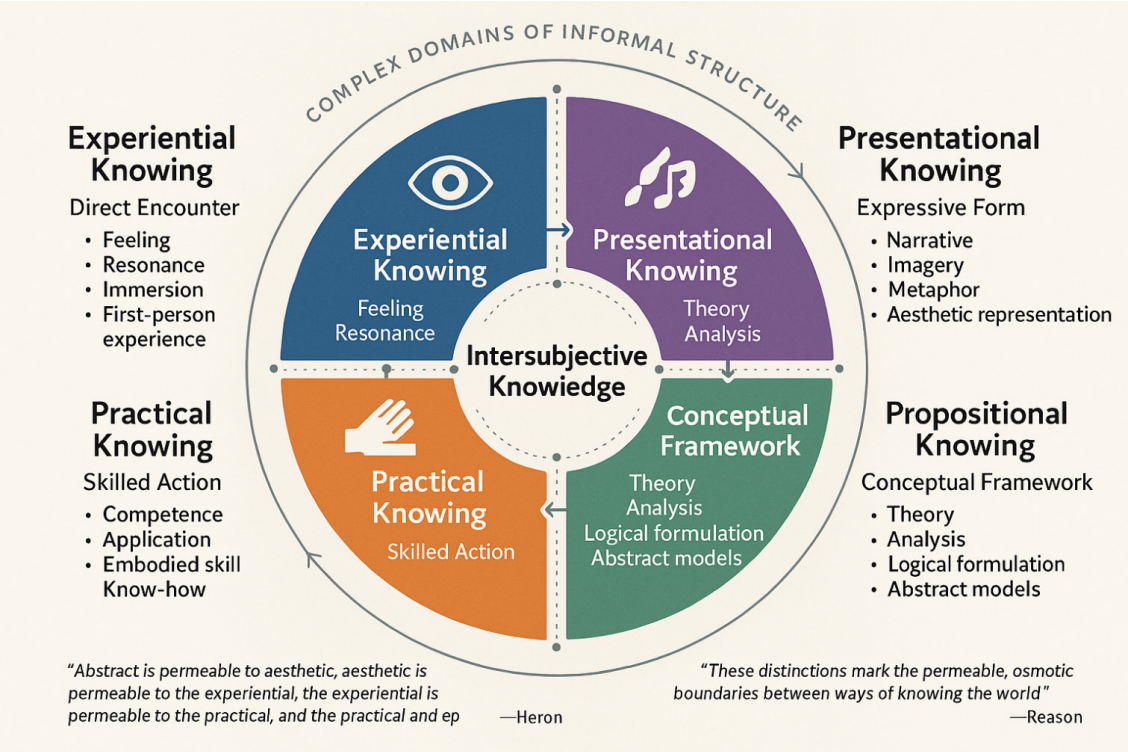

Figure 3. Heron and Reason's Extended Epistemology Model Illustrating the Four Interdependent Ways of Knowing That Operate Within Complex Domains of Informal Structure [1].

This extended epistemology carries profound implications for knowledge management in CDIS. Firstly, it suggests that effective knowledge frameworks must accommodate all four dimensions rather than privileging propositional knowledge alone. Secondly, it foregrounds what Heron terms the "primacy of the practical"—the understanding that knowledge ultimately serves effective action in the world rather than abstract comprehension [46].

Implementing such sophisticated frameworks, however, encounters distinctly human challenges in practice. Even the most refined intersubjective methodology must contend with three fundamental human realities:

(1) Power dynamics that distort communication.

(2) Affective responses that influence rational deliberation.

(3) Institutional constraints that limit full participation.

The "human, all too human" nature of knowledge communities introduces complexities that no purely conceptual framework can resolve. Consider, for instance, how power asymmetries shape knowledge validation in interdisciplinary teams. When an AI ethics committee comprises both technical specialists and humanities scholars, differences in institutional authority, technical vocabulary and cultural capital can systematically privilege certain voices whilst marginalising others. Similarly, affective dynamics—professional rivalries, institutional loyalties or simple interpersonal tensions—may undermine even meticulously designed deliberative processes.

The KMoS-SSA framework acknowledges these human dimensions through several structural elements:

- It incorporates explicit power-balancing mechanisms, including structured turn-taking, anonymous contribution phases and designated advocacy roles for minority perspectives.
- It recognises affective dimensions by incorporating reflexive practices that encourage participants to articulate emotional responses and examine their influence on judgement.
- It addresses the embodied, experiential dimension of knowledge through techniques such as scenario enactment and simulated stakeholder engagement.

This expanded approach recognises that knowledge in CDIS is inevitably produced by human beings operating

within social contexts marked by power differentials, affective responses and embodied experience. The goal is not to eliminate these dimensions—an impossible task—but to acknowledge and manage them through structured processes that enhance rather than diminish epistemic quality.

This expanded conception of knowledge—encompassing experiential, presentational, propositional and practical dimensions—resonates with our earlier discussion of the emotional, cultural and embodied aspects of human knowledge (see section 5.2). It reinforces our critique of epistemological neutrality by demonstrating the multidimensional nature of knowing that cannot be reduced to purely propositional claims.

7. Strengthened Counterargument Response

7.1. Popper and Falsification

Popper's falsification methodology appears to offer a solution to neutrality problems by establishing objective criteria for scientific knowledge. However, this defence fails on three levels:

·First, logically, it commits a category error by conflating procedural objectivity with epistemic neutrality. While falsification provides procedures for hypothesis testing, it cannot eliminate theory choice subjectivity.

?Second, empirically, the history of science demonstrates that falsified theories are often preserved through ad hoc modifications rather than abandoned [5], revealing the social and cognitive factors that supersede purely logical considerations.

?Third, practically, even if falsification functioned perfectly in ideal conditions, it would still be insufficient for establishing neutrality in CDIS contexts where complex, tacit knowledge resists formalization into falsifiable hypotheses.

While falsification has generated verifiable knowledge in fields like physics, scientific knowledge remains historically contingent. Einstein's relativity theory fundamentally reframed Newtonian mechanics' supposedly absolute principles, demonstrating how even our most established scientific frameworks remain susceptible to paradigmatic revision. This historical mutability underscores knowledge's context-dependency rather than supporting claims of absolute objectivity.

7.2. Replicability and Peer Review

Replicability and peer review function as institutional mechanisms for reducing subjectivity in scientific knowledge production [47]. Peer review subjects research to expert scrutiny, identifying methodological flaws, interpretative biases, and unwarranted conclusions. Replication studies similarly enable error correction and methodological refinement.

These mechanisms enhance knowledge reliability but remain vulnerable to systemic biases within scientific communities. Dominant paradigms, publication incentives, and disciplinary conventions can influence which studies undergo replication and how peer review operates. Thus, while these practices improve epistemic quality, they constitute intersubjective rather than objective frameworks, confirming rather than refuting the paper's central thesis.

7.3. Use of Mathematical and Formal Models

Mathematical models in physics and artificial intelligence provide structured approaches that reduce reliance on subjective interpretation [48]. Their precise formalisms enable accurate phenomenon description and prediction while establishing clear criteria for hypothesis evaluation.

However, model formulation inevitably involves human decisions about which variables to include which relationships to prioritise, and which mathematical structures to employ. Models function as tools rather than objective representations of reality. Their predictive success demonstrates pragmatic utility, not freedom from subjective influence. The fact that technological applications function effectively validates the intersubjective framework that produced them rather than proving absolute objectivity.

7.4. Epistemic Neutrality as a Regulative Ideal

Some epistemologists maintain that epistemic neutrality retains value as a regulative ideal guiding knowledge production, even if never fully attainable. In [8], it is argued that structured methodologies—including peer review, procedural transparency, and empirical verification—mitigate subjectivity's effects while enhancing epistemic

reliability.

Chalmers similarly suggests that scientific inquiry's self-correcting nature gradually refines knowledge claims, approaching objectivity asymptotically rather than achieving it absolutely [48]. This perspective aligns with this paper's argument that intersubjective frameworks can methodically address subjectivity through critical scrutiny and collective evaluation, producing increasingly reliable knowledge without requiring absolute objectivity claims.

8. Conclusions

The demonstration of objectivity's phantom nature carries four significant implications: First, epistemologically, it requires recalibrating our understanding of knowledge claims as contextually situated rather than universally applicable; second, methodologically, it necessitates developing frameworks that acknowledge and account for subjective elements rather than attempting to eliminate them; third, ethically, it demands greater transparency about the values and perspectives informing knowledge production; and fourth, practically, it suggests that CDIS management requires collaborative approaches that leverage multiple perspectives rather than privileging singular expertise. These implications extend beyond theoretical importance to reshape how knowledge is validated, disseminated, and applied across domains from scientific research to artificial intelligence development.

8.1. From Theory to Practice: Intersubjective Knowledge in Human Enterprises

The theoretical examination of the limitations of epistemological neutrality is of genuine significance when considering how specialists operating within Complex Domains of Informal Structure navigate their daily knowledge practices. The dissolution of objectivity as an absolute ideal is not merely an abstract philosophical position, but a lived reality for practitioners who must make consequential decisions amidst uncertainty, ambiguity, and competing interpretations.

In order to comprehend the practical implications of these theoretical frameworks, it is necessary to consider how the four implications identified earlier manifest in concrete human enterprises:

Epistemological Recalibration in Clinical Practice: In the domain of medical diagnostics, the contextual situatedness of knowledge becomes evident when clinicians encounter rare conditions that present with ambiguous symptomatology. A senior neurologist's interpretation of subtle cognitive decline patterns might draw upon decades of experiential knowledge that resists complete articulation yet proves diagnostically crucial. Rather than disregarding such tacit knowledge as merely "subjective", intersubjective frameworks legitimise these insights by subjecting them to structured scrutiny among multidisciplinary teams [16]. In this context, knowledge claims are not merely subjective opinions but rather are substantiated by rigorous collective examination, thus ensuring their validity. The neurologist who recognises that their diagnostic framing is inevitably shaped by their training paradigm, institutional context, and cognitive tendencies participates more thoughtfully in collaborative decision-making than one who mistakenly believes in their complete neutrality [8].

Methodological Innovation in Urban Planning: The necessity of frameworks that acknowledge subjectivity is manifest in contemporary urban development challenges. When city planners employ KMoS-SSA methodologies to integrate popular empirical knowledge with technical expertise in developing flood mitigation strategies, they transform what might be dismissed as "anecdotal evidence" into systematically incorporated wisdom [17]. The integration of experiential knowledge from residents with hydrological models, facilitated by community workshops, has been shown to result in a more comprehensive understanding of historical flood patterns than could be achieved by individual perspectives alone. This methodological approach does not eliminate subjectivity but rather manages it through explicit acknowledgement and structured integration of diverse epistemic standpoints [32].

Ethical Transparency in Algorithmic Governance: The ethical demand for greater transparency is becoming increasingly urgent in the context of cognitive solutions that support decision-making processes. These solutions are determining financial lending, criminal sentencing, and educational opportunity allocation. When a cognitive solutions development team explicitly documents the socioeconomic composition of their training data, acknowledges the historical biases inherent in their validation

metrics, and subjects their fairness assumptions to diverse specialist critique, they practise the ethical transparency that intersubjective epistemology demands [10]. The philosophical recognition that perfect neutrality is unattainable is reflected in concrete governance practices where bias is presumed to be present rather than absent. Consequently, bias is actively managed rather than being perpetuated inadvertently [29].

Collaborative Approaches in Scientific Research: The practical shift towards collaborative frameworks is manifesting in the increasingly prevalent structuring of interdisciplinary initiatives by research institutions. When climate scientists, economists, indigenous knowledge holders, and policy experts collaborate in the development of regional climate adaptation strategies, they demonstrate how CDIS management benefits from the integration of diverse perspectives rather than relying on the expertise of a single discipline [7]. The conventional paradigm, predicated on the pursuit of objective truth by individual scientific geniuses, is superseded by structured processes wherein diverse epistemic communities engage in negotiations concerning knowledge validity. Scientists who recognise the inherent theoretical nature of their observational frameworks are able to participate more effectively in collaborative research projects than those who perpetuate the illusion of complete objectivity [5].

8.2. Practical Guidance for CDIS Specialists

The philosophical insights developed throughout this paper offer cognitive analysts, who are the specialists operating within these complex domains not merely intellectual clarification but practical guidance. By acknowledging the illusory character of absolute objectivity, practitioners may be able to:

(1) **Cultivate Epistemic Humility**: The acknowledgement of the unavoidability of subjective mediation engenders a reflective stance towards knowledge claims made by the individual. It has been demonstrated that surgeons who acknowledge the influence of their training paradigm on treatment preferences become more receptive to alternative approaches and more attentive to potential blind spots in their reasoning [39].

(2) **Engage in Metacognitive Practice**: It is evident that regular reflection on the cognitive structures, disciplinary paradigms, and sociocultural contexts that shape interpretative frameworks enables more thoughtful knowledge application. The economist who consciously interrogates how their theoretical commitments influence their data interpretation produces more nuanced and responsible analyses [31].

(3) **Implement Structured Intersubjectivity**: Rather than pursuing an impossible neutrality, practitioners can design deliberative processes that systematically incorporate diverse perspectives and critically examine interpretative divergences. The judicial panel that explicitly delineates how different legal traditions frame a novel case builds a more robust decision than one that simply aggregates individual opinions [13].

(4) **Transform Disagreement into Productive Tension**: When epistemic differences are understood to arise not from error but from distinct interpretative frameworks, disagreement becomes a resource for knowledge refinement rather than an obstacle to be overcome. The research team that maps competing interpretations of experimental results, rather than prematurely resolving them, often generates more innovative theoretical advances [8].

This practice can be termed "realistic reflection"—a concept central to this journal's mission—which is distinguished from both the naive pursuit of perfect objectivity and a surrender to radical relativism. Rather, it represents a disciplined, collective process of knowledge validation that acknowledges the inescapability of perspective whilst distinguishing between well-warranted and poorly supported knowledge claims. Realistic reflection thus embodies the very integration of philosophical theory with practical engagement that characterises meaningful epistemological work in complex domains.

The philosopher John Dewey posited that knowledge is not merely a passive observer of events, but rather an active form of engagement with the world [49]. In Complex Domains of Informal Structure, this insight becomes particularly salient. It is important to note that knowledge is not a perfect reflection of reality, nor is it a mere social construction. Instead, it is a continually refined instrument for effective engagement with complex phenomena. When practitioners approach knowledge as provisional, perspectival, and pragmatic, they paradoxically enhance its reliability and utility in addressing real-world challenges.

The spectre of objectivity is thus superseded by epistemic order, giving rise to a more sophisticated, reflective, and ultimately more responsible praxis of knowledge creation and application.

8.3. Philosophical Implications and Broader Significance

This reflection into epistemological neutrality across both Complex Domains of Informal Structure and general epistemology reveals that human knowledge inevitably bears the imprint of subjective mediation. The phantom of absolute objectivity dissolves when we recognise how perception, interpretation and knowledge validation are invariably conditioned by cognitive structures, historical paradigms and sociocultural contexts. Yet this recognition need not precipitate epistemic relativism; instead, it invites a philosophical reconsideration of how we distinguish valid knowledge from unsupported opinion—a central concern for both philosophical inquiry and practical application.

Intersubjectivity and critical scrutiny emerge as foundational elements for a more rigorous and responsible epistemology. Objectivity retains its value not as an absolute state but as an asymptotic goal approached through collective evaluation, rational discourse and continuous knowledge refinement. This perspective transcends purely theoretical concerns, offering practical implications for science, politics, technological development and particularly artificial intelligence—domains where presumptions of neutrality carry significant ethical and social consequences.

The philosophical insights developed herein directly address the challenge of integrating philosophical theory with practical life—a core mission of contemporary philosophical engagement. By demonstrating how intersubjective frameworks can navigate inherent subjectivity in knowledge production, this research contributes to a deeper understanding of philosophical thought whilst enhancing public philosophical literacy regarding the limitations and possibilities of knowledge claims. Our analysis of epistemological neutrality within CDIS particularly illuminates the intersection of philosophy with real-world concerns, demonstrating how philosophical analysis can inform practical approaches to knowledge management in complex environments.

It is worth reflecting, in closing, on how this paper's analytical style relates to its epistemological claims. Throughout, we have employed a formal, logical and systematic approach that privileges propositional knowing—the very mode of knowledge whose limitations we have sought to illuminate. This apparent tension is not a contradiction but rather an acknowledgement of the complementary relationship between rigorous analysis and broader forms of knowing. The structured argumentation offered here represents one essential dimension of philosophical reflection, deliberately foregrounding the rational articulation of concepts and arguments. Yet this approach gains its fullest meaning when understood as one element within a more comprehensive epistemological landscape that embraces experiential, presentational and practical dimensions of knowledge [1]. The paper thus exemplifies both the power and the inherent limitations of propositional knowing, inviting readers to situate its analytical insights within their own practical contexts and lived experiences.

While counterarguments propose alternative paths to objectivity, their critical examination reveals that even paradigmatic exemplars of objectivity—including scientific laws and mathematical models—remain shaped by historical contingencies, interpretative frameworks and ongoing revisability. Truth emerges not through illusory claims of absolute objectivity but through continuous critical refinement within epistemic communities that acknowledge their contextual limitations. This conclusion fosters precisely the kind of dialogue between philosophy and practical concerns that enriches both philosophical discourse and its applications across diverse domains of human endeavour.

Author Contributions

Conceptualization, J.R.-O. and K.O.-S.; methodology, J.R.-O.; formal analysis, J.R.-O.; investigation, J.R.-O.; resources, J.R.-O.; writing—original draft preparation, J.R.-O.; writing—review and editing, J.R.-O. and K.O.-S.; visualization, J.R.-O.; supervision, J.R.-O.; project administration, J.R.-O. All authors have read and agreed to the published version of the manuscript.

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