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Integrating Kuhn's Taxonomic Incommensurability and Derrida's Iterability

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Research Article

Keywords:

Posted Date: September 15th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10884010/v1

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Additional Declarations: No competing interests reported.

Abstract

This article investigates the enduring philosophical challenge of understanding scientific theories across paradigms, focusing on the nature and possibility of interpretation amid taxonomic incommensurability. Building on Thomas Kuhn's mature distinction between translation failure and interpretive bilingualism within scientific lexicons, the study elaborates on how local clusters of interdefined scientific terms resist exact semantic equivalence across conceptual schemes. To address the tension between preserving meaning and enabling intelligibility, Jacques Derrida's notion of iterability is employed. Derrida's insight into the repeatability and contextual displacement of signs reveals that interpretation necessarily involves re-inscription, transforming rather than simply transferring meaning, owing to the non-saturability of context and the dynamic deferral of meaning (différance). By dialoguing Kuhn's historically grounded epistemological analysis with Derrida's structural linguistic framework, the article advances a model of transformative interpretation. This model defines cross-paradigm understanding as a historically and conceptually constrained practice that balances preserving original conceptual relations with necessary alteration, thus avoiding both naive equivalence and radical relativism. It also sets forth criteria for interpretive accountability, including textual fidelity, historical sensitivity, structural coherence, and epistemic openness. The synthesis presented here enriches philosophical hermeneutics and translation theory within the philosophy of science, offering a robust conceptual foundation to explicate how scientific revolutions constitute a dynamic negotiation of meaning across sometimes incommensurable conceptual worlds. This approach fosters a nuanced, epistemically responsible engagement with scientific innovation and its complex continuity and rupture.

1. Introduction

The Problem of Understanding across Paradigms

In his later work, Thomas Kuhn reconceptualized the challenge of incommensurability between scientific theories. Rather than portraying incommensurability as a total, insurmountable barrier to communication, Kuhn emphasized its local character, arising specifically among certain interdefined terms within scientific lexicons (Kuhn, 1970/1996; Sankey, 1997). These lexicons, structured as taxonomies of natural kinds and concept, often fail the test of exact translation because the natural categories operating in one scientific framework do not straightforwardly transfer into the categorial structure of another (Kuhn, 1970/1996; Sankey, 1997). Importantly, Kuhn rejected the idea that incommensurability entails absolute incomparability or mutual unintelligibility; instead, he argued that members of one scientific community can learn to navigate another's scientific lexicon effectively, a process he analogized with bilingualism (Kuhn, 1970/1996; Sankey, 1997; O'Hara, 1995). This refined position frames interpretation as possible even where direct translation, understood as a stable, one-to-one mapping of terms - fails. Thus, Kuhn's mature account situates incommensurability as a relation of translation failure among local subsets of theoretical vocabulary rather than global untranslatability between whole languages or worldviews (Kuhn, 1970/1996; Sankey, 1997).

Despite this progress in clarifying the nature of incommensurability, a persistent and critical philosophical issue remains: What kind of understanding does interpretation amount to if it neither preserves the original lexicon unchanged nor fully assimilates it into the interpreter's own taxonomy? This question highlights the conceptual tension at the heart of scientific communication across paradigms, where stability and alteration of meaning coexist in a delicate balance. It is precisely at this juncture that Jacques Derrida's philosophy of language and translation becomes relevant. Derrida's notion of iterability reveals how linguistic signs necessarily function through repeatability beyond any original context, implying that meanings are never fixed but are constantly deferred and transformed through repetition (Derrida, 1976/1981; Davis, 2001). This non-saturable context of meaning destabilizes any simplistic notion of faithful, invariant translation and underscores that interpretation always involves both preservation and transformation (Derrida, 1976/1981; Davis, 2001). Derrida's perspective therefore has the potential to illuminate the precise conditions under which scientific lexicons, though taxonomically incommensurable, can nonetheless be meaningfully interpreted across paradigms without collapsing into either exact equivalence or arbitrary reconstruction.

The central research question guiding this article is: Can Derrida's concept of iterability clarify how interpretation across taxonomically incommensurable scientific frameworks is possible without reducing that interpretation to either exact translation or arbitrary re-description? To sharpen this inquiry, three subsidiary questions are considered: First, what does Derrida's framework contribute beyond Kuhn's distinction between translation and interpretation? Second, does Derrida's universal model of linguistic instability risk erasing the historical specificity that characterizes Kuhnian scientific revolutions? Third, can cross-paradigm interpretation remain epistemically constrained (subject to rational standards) even when it necessarily involves transformative alteration?

The thesis advanced here is that Derridean iterability elucidates the form of cross-paradigm understanding, though not its historical cause. Kuhn explains why particular scientific lexicons become locally incommensurable, rooted in the empirical and conceptual evolution of scientific practice. Derrida, by contrast, clarifies why the interpretation of these lexicons cannot preserve an invariant semantic content across different contexts. Thus, cross-paradigm understanding should be conceived as transformative interpretation: a constrained re-inscription that renders another taxonomy intelligible while necessarily altering the conceptual relations through which it is articulated. This formulation ensures Derrida's insights complement rather than replace Kuhn's, avoiding the risk of privileging linguistic indeterminacy over the historically grounded epistemology of science.

This article contributes to the philosophy of science and translation theory in three interrelated ways. First, it clearly distinguishes Kuhn's refined concept of taxonomic incommensurability from earlier, overgeneralized notions of total untranslatability, emphasizing the local and structured nature of translation failure within scientific lexicons (Kuhn, 1970/1996; Sankey, 1997). Second, it employs Derrida's concept of iterability to clarify Kuhn's important but sometimes under-theorized distinction between translation (as linguistic equivalence) and interpretation (as context-sensitive understanding mediated by language use) (Derrida, 1976/1981; Davis, 2001). Third, it proposes transformative

interpretation as a middle ground that transcends the dichotomy of semantic equivalence and radical unintelligibility, capturing how meaning is both preserved and altered in cross-paradigm scientific understanding.

The article proceeds as follows. Section 2 reconstructs Kuhn's mature account of lexical incommensurability, delineating his nuanced distinctions among translation, interpretation, and bilingualism. Section 3 explores Derrida's notion of iterability and its implications for understanding the instability of meaning and the challenge of translation. Section 4 critically examines points of convergence and essential differences between Kuhn and Derrida, emphasizing the importance of resisting assimilation. Section 5 presents the article's model of transformative interpretation as a synthesis of their insights. Section 6 addresses possible objections concerning relativism, universalization, and the epistemic constraints of scientific knowledge. Section 7 demonstrates the model's practical import by applying it to a specific scientific transition. Finally, Section 8 summarizes the findings, articulating precisely what has been demonstrated and acknowledging the scope and limits of the argument.

2. Kuhn's Mature Theory of Taxonomic Incommensurability

2.1 From Paradigms to Lexical Taxonomies - Thomas Kuhn's philosophical understanding of scientific revolutions and the nature of incommensurability evolved significantly across three stages, moving from a broad notion of paradigm shifts toward a more precise conception focusing on lexical taxonomies.

Early Kuhn - In the original 1962 presentation of The Structure of Scientific Revolutions, Kuhn characterized paradigms as overarching frameworks that organize scientific research and shape normal science (Kuhn, 1970/1996). Revolutions, in this early picture, introduce both conceptual and perceptual discontinuities so profound that competing paradigms differ in the very standards, classifications, and ways of observing phenomena they employ. This perspective strongly rejected cumulative models of scientific progress, suggesting instead that paradigm changes disrupt continuity. However, the account at this stage did not yet fully develop the idea of taxonomic or lexical incommensurability; that is, Kuhn had not yet focused on the structured interrelations among scientific terms constituting a taxonomy (Kuhn, 1970/1996; Sankey, 1997).

Transitional Kuhn - By the late 1960s, notably in the 1969 postscript to Structure and subsequent essays, Kuhn refined his framework by distinguishing the disciplinary matrix (shared beliefs, values, exemplars, and norms) from paradigms themselves (Kuhn, 1970/1996; Sankey, 1997). This revision allowed Kuhn to separate the problem of incommensurability from the stronger claim of complete incomparability. Communication difficulties between paradigms are acknowledged, but they do not imply total unintelligibility or skepticism about scientific rationality. Scientists, Kuhn argued, can learn to understand rival lexicons to some extent, enabling partial translation and interpretation (Kuhn, 1970/1996; O'Hara, 1995).

Later Kuhn - In his mature account, Kuhn introduced a sophisticated lexical-taxonomic conception of incommensurability, emphasizing how scientific lexicons classify objects and phenomena through networks of interdefined kind terms embedded in structured taxonomies (Sankey, TI, 1998; Chen, 1997). Terms acquire identity through systematic relations of similarity, contrast, and exclusion; these relations are constitutive of meaning, not incidental. Crucially, some taxonomic structures cannot be mapped onto others without violating their internal coherence, producing local incommensurability. Rather than global or wholesale breakdowns, incommensurability is therefore a feature concerning subsets of theoretical vocabulary resisting direct structural transfer (Sankey, 1998, TI). This mature view clarifies that incommensurability involves translation failure among taxonomic frameworks rather than categorical collapse (Kuhn, 1970/1996; Sankey, 1997).

This chronological development is essential for situating Kuhn's contribution precisely and avoiding conflations between his early and later positions.

What Is a Lexical Taxonomy? A lexical taxonomy is a structured system in which categories have meaning through their relations to each other, learned and employed collectively by a scientific community Sankey, TI).

This system typically involves:

Hierarchy: Categories are organized from general to specific.

Contrast classes: Mutually exclusive sets of categories delineate boundaries and create semantic space.

Kind terms: These scientific terms represent natural kinds or categories within the taxonomy, whose identity depends on their place within the structure.

No-overlap principle: Categories often follow the rule that contrasts do not overlap.

Exemplars: Typical instances/examples help scientists learn and internalize these taxonomic relations (Kuhn, 1970/1996). For instance, the meaning of the category "planet" is constituted partly through its contrast to "star," "satellite," and "comet." Changes in the understanding or boundary of one category induce a reorganization of the relations among others, illustrating the systemic nature of lexical taxonomies: "How the no-overlap principle leads to untranslatability may be illustrated by means of Kuhn's example of celestial taxonomy. Suppose one sought to translate the Ptolemaic term "planet" into the lexicon of Copernican astronomy. In addition to planets, other than the earth, which are classified as planets by Copernican astronomy, the Ptolemaic category planet includes the sun and the moon. Thus, to translate the Ptolemaic term "planet" into the Copernican lexicon would require incorporation into the latter taxonomy of a single category containing members of three distinct Copernican categories. However, no such category may be introduced as a natural kind of the Copernican taxonomy, since the Ptolemaic category combines entities together as members of a single kind which the Copernican scheme treats as members of distinctnatural kinds." (Sankey, 1998:11)

Incommensurability as Translation Failure: Kuhn's notion of incommensurability can be understood primarily as a problem of translation failure between competing scientific theories and their lexicons (Sankey, TI, 1998; Chen, 1997).

Importantly, this failure does not mean that:

- Scientists cannot communicate or share evidence.

- Theories are completely incomparable or evaluation is impossible.

- Historical scientific theories are inaccessible.

Paradigm choice is arbitrary or irrational. Rather, Kuhn argues that no neutral vocabulary exists that straightforwardly substitutes terms from one taxonomy into another while preserving the systematic relations essential to their meaning. Hence, simple word substitution does not achieve genuine translation; rather, exact structure-preserving translation fails (Sankey, TI, 1998). Nevertheless, interpretive reconstruction, a flexible, context-sensitive understanding, remains possible.

Translation, Interpretation, and Bilingualism Central to Kuhn's mature view is his clear distinction between translation and interpretation and his analogy of scientists as bilingual users of competing conceptual frameworks (Chen, 1997).

Translation aims for systematic equivalence: mapping terms between lexicons to preserve meaning invariantly.

Interpretation seeks understanding within the foreign lexicon, sensitive to context and usage where formal equivalence fails.

Language learning involves acquiring terms as members of a taxonomic network within the scientific community.

Bilingualism means navigating two incompatible lexicons without merging them into a single universal language. This framework raises a fundamental philosophical question: If one learns another scientific lexicon, how can that lexicon be represented or re-articulated in new contexts without being transformed by the interpretive act itself? Kuhn recognizes this issue but stops short of fully analyzing its consequences, a gap that Derrida's concept of iterability later addresses (Chen, 1997).

Limits of Kuhn's Account - While Kuhn adeptly explains why taxonomic relations block exact translation, his account provides insufficient detail on how interpretive repetition across distinct contexts both preserves and transforms conceptual identity (Chen,1997; Sankey, TI, 1998). Specifically, Kuhn's framework does not fully illuminate the dynamic tension between continuity and alteration in the re-inscription of scientific concepts during paradigm shifts. This lacuna signals the need for complementary conceptual tools addressing the iterative and contextual nature of meaning, as previously said, issues Derrida's notion of iterability is poised to clarify.

This chapter has reconstructed Kuhn's mature theory of taxonomic incommensurability as a localized phenomenon involving translation failure within interdefined lexical frameworks. It distinguished this from global incomparability and situated the interpretive challenges Kuhn identifies as laying crucial groundwork for Derrida's contribution to understanding transformative interpretation.

3. Derrida: Iterability, Context, and the Non-Identity of Translation

3.1 Why Iterability Is the Relevant Concept - At the foundation of Derrida's intervention into the problem of scientific translation and interpretation is the elementary insight regarding the nature of signs: a sign can only function if it is repeatable (Derrida, 1976/1981; Davis, 2001). Words, formulas, categories, or statements must be recognizable across multiple occasions of use; however, no repetition ever occurs in a completely identical context. Each utterance or inscription happens in a context distinct from the original, even if related.

This leads to a fundamental double movement: on the one hand, recognizability requires some degree of repetition; on the other, repetition itself entails a detachability from the original environment or context of use. Such displacement necessarily introduces the possibility that the sign may function differently from before. Consequently, semantic identity is neither absolutely fixed nor irretrievably lost but emerges through this tension between repetition and differentiation. This conceptual tension, between stability and alteration, is precisely what Derrida's notion of iterability articulates and what is needed to understand how scientific lexicons can be interpreted across paradigms despite their taxonomic incommensurability (Davis, 2001; Derrida, 1976/1981).

3.2 The Non-Saturability of Context Derrida asserts the non-saturability of context: no context can ever be finally or exhaustively closed (Derrida, 1976/1981; Davis, 2001). This claim is subtle and often misinterpreted. It does not mean that context is irrelevant or that anything goes; rather, it means the exact conditions delimiting meaning are always open to supplementation, alteration, or redescriptions. Because every context can be extended or re-described, a sign's future uses cannot be perfectly predetermined by its initial surroundings.

Applied to scientific language, this insight has significant implications. Scientific terms always function within disciplinary contexts that give them their normative and epistemic force (Davis, 2001). However, when a term from a past scientific lexicon is historically interpreted - it is in effect relocated into a new context, another disciplinary or historiographical framework that differs from the original. This relocation is a necessary condition for understanding the term but simultaneously ensures that the term can no longer remain wholly untouched or semantically invariant (Derrida, 1976/1981). In sum, context matters profoundly, but context's openness means that meaning is always subject to historicized reinterpretation.

3.3 Iterability and Intention - Contrary to some readings that downplay intentions, Derrida does not claim that authorial or speaker intentions are irrelevant (Derrida, 1976/1981; Davis, 2001). Rather, he argues that intention cannot exhaust the functioning of a sign. Once a sign is produced, it becomes detached

from its original producer: its meaning is no longer secured solely by the producer's intent. Signs can be reused, interpreted, and deployed in subsequent contexts, crucially including those temporally and spatially distant from the original act. This explains how historical scientific texts continue to be legible and interpretable long after their initial setting has disappeared.

This explains why historical scientific texts remain interpretable long after their creation, or their signs acquire meanings beyond the initial intent of their authors. For example, texts on nationalism have been read and reinterpreted across different political and cultural contexts throughout the twentieth century, showing how signs transcend original intentions and gain new significance across history. (Kramer, 1997).

This aspect of iterability, that signs survive their original contexts, also entails the possibility of alteration. Scientific concepts survive precisely through their capacity to be detached, transported, and recontextualized, but such survival necessarily admits transformation (Derrida, 1976/1981). This feature is critical in philosophy of science, for it allows for cross-paradigm interpretation: past concepts remain accessible yet not invariant, embodying both continuity and change.

3.4 Différance as a Supporting Concept Following the exposition of iterability, Derrida's notion of différance helps elucidate the relational and temporal character of conceptual identity (Derrida, 1968/1982; Davis, 2001). Differance denotes the play of difference and deferral in meaning: terms acquire their identity through their differences from other terms within a linguistic system and through their continuous deferral over time.

Conceptual identity, then, is a relational effect that unfolds across temporal uses and reinterpretations. This denies the assumption that meaning is ever fully present or closed within a single act or context. However, différance should not be understood as a causal force that drives paradigm change; it is rather a conceptual framework that questions the completeness and self-containment of conceptual identity, making it apt to analyze scientific translation without predetermining its historical dynamics.

3.5 Translation as Re-Inscription A central consequence of Derrida's account is that translation is not the transport of an already complete and stable meaning from one context to another (Davis, 2001; Derrida, 1976/1981). Instead, translation must be conceived as re-inscription: the process by which a sign is inscribed anew within a different network of differences and contextual relations.

This does not imply that translation is arbitrary or purely subjective. A translation remains accountable to multiple constraints: it must answer to the source text or discourse, adhere to conventional uses within languages, remain consistent with historical evidence, respect conceptual relations endemic to the scientific lexicon, serve specific interpretive purposes, and be open to correction or revision (Derrida, 1976/1981; Davis, 2001).

The notion of translation as re-inscription thus prepares the ground for the article's concept of transformative interpretation. This model allows for the necessary transformation of meaning without

forfeiting rational constraints and accountability.

3.6 Limits of the Derridean Contribution While Derrida's insights illuminate the structural conditions governing signification and the non-identity of translation, they do not explain several critical historical and epistemic aspects of scientific change (Derrida, 1976/1981).

Notably, Derrida does not address:

Why one scientific taxonomy historically displaces another;

How empirical anomalies contribute to theory change;

Why one theory may prove epistemically superior or more problem-solving;

The constraining role of scientific instruments and experimental practice on conceptual development;

What ultimately grounds the scientific rationality of particular revolutions. Derrida's framework provides a philosophical account of the relations between signs and contexts, emphasizing openness and recontextualization, but the historically specific causes and justifications for scientific change remain within Kuhn's epistemological analysis.

This chapter reconstructs Derrida's notion of iterability as the key concept for understanding the form of translation and interpretation across scientific paradigms. By elaborating the non-saturability of context, the role of intention, différance's relational identity, and the view of translation as re-inscription, it sets the conceptual groundwork for analyzing how scientific lexicons may be meaningfully but transformatively interpreted.

4. Convergence without Assimilation: Kuhn and Derrida in Dialogue

4.1 The Point of Convergence At the heart of both Thomas Kuhn's and Jacques Derrida's philosophies lies a shared rejection of a classical model of meaning transmission, namely, the idea that meaning can be transferred unchanged between contexts through a neutral equivalence. Kuhn's mature theory of incommensurability diagnoses this problem as arising from historically different lexical taxonomies within scientific paradigms. These taxonomies, structured networks of interrelated kind terms, make exact translations structurally impossible because the conceptual relations that bestow identity on each term cannot be preserved intact across paradigms (Sankey, TI, 1998).

Derrida's conceptual framework, by contrast, identifies the problem of meaning transfer in the intrinsic iterability of signs combined with the non-saturability of context (Davis, 2001). For Derrida, every sign is necessarily repeatable and detachable from any original use, but this repetition always occurs in a new, displaced context - one that can never be exhaustively closed or fully determine subsequent meanings. Whereas Kuhn situates the problem in historically evolved taxonomic differences, Derrida sees it in the structural conditions of signification itself. Both perspectives converge on the insight that meaning is

never stably transferable by invariant equivalence, but their diagnoses highlight complementary dimensions of this phenomenon.

4.2 The Fundamental Difference Despite this convergence, a fundamental divergence distinguishes Kuhn and Derrida in both scope and emphasis. Kuhnian incommensurability is local, historical, and taxonomic: it involves specific clusters of concepts within scientific lexicons that have evolved divergently over time, producing structured blocks where translation attempts fail (Sankey, TI, 1998). It is a historically contingent, epistemologically significant discontinuity grounded in the empirical trajectories of science.

Derridean iterability, by contrast, is general and structural; it is a formal condition of language and sign systems that applies universally. Iterability captures the necessary repeatability and contextual displacement of all signs and is thus a meta-linguistic insight about the non-identity of meaning across all contexts (Davis, 2001). This difference is productive: Kuhn specifies when and where translation fails in scientific discourse, and Derrida clarifies why any attempt at interpretation must inevitably involve re-inscription rather than pure reproduction of meaning. Kuhn's work maps historical boundaries of conceptual change, while Derrida provides a philosophical account of the conditions enabling and constraining semantic transmission and transformation.

4.3 The Danger of Universalization - A common objection to Derrida's framework is that, if every sign is iterable and every context non-saturable, does this imply that all discourse is equally incommensurable? Would Derrida's account therefore risk collapsing all semantic relations into radical unintelligibility, erasing historical specificity? The answer is no. A crucial distinction must be maintained between ordinary contextual variation and taxonomic reorganization.

Ordinary contextual variation occurs when a term is used across differing but related situations, yet its basic taxonomic relations remain sufficiently stable to permit mutual understanding: "I claim that scientific realism is uncompromised by the thesis of taxonomic incommensurability. As we have just seen, Kuhn argues that translation failure between theories precludes convergence on truth, and he dismisses correspondence between theory and reality because of the conventionality of lexicons. Yet, as I have argued, either Kuhn's rejection of progress towards truth nor his dismissal of correspondence truth may be sustained on the basis of taxonomic incommensurability. As a result, both the scientific realist view of the aim of science and of the nature of truth emerge unscathed by incommensurability." (Sankey, TI, 1998:15). Taxonomic reorganization, by contrast, involves a structural overhaul of the relations that constitute multiple terms' identities, so extensive that direct substitution without loss or distortion is impossible.

Derrida's constitutive contextual openness addresses the first dimension: it acknowledges semantic flux as an inherent condition of linguistic meaning: "Every strand of every text in the narrow sense – source or target text, for instance – produces meaning as a process of differing not only from other elements of 'language', but from all elements in this open, inexhaustible weave. The movement of difference in the chain of signifiers, therefore, is not restricted to linguistic signifiers, but always includes the 'real', 'economic', 'historical', 'socio-institutional', etc. This openness does not erase the irreducible singularity

of each event, but demonstrates that its exhaustive, final interpretation is not possible, for two reasons. First, a 'text', in the traditional sense, cannot be cleanly delineated from 'context'. Demarcations of a text's inside/outside can only be contingent, and the assumptions underlying any such demarcation will mark its own limit." (Davis, 2001:24) Kuhn's taxonomic incommensurability attends to the second dimension: historically intensified, structural discontinuities that produce partial or local incommensurabilities. Therefore, Derrida was not dissolving the historical specificity; rather he situates it within a broader framework of necessary openness to difference and re-articulation (Sankey, Taxonomic incommensurability, 1998). Very often it was said that there's no subject or truth in Derrida's deconstruction, but shortly we can answer to that objection in the following way: "Deconstruction does not say there is no subject, there is no truth, there is no history. It simply questions the privileging of identity so that someone is believed to have the truth. It is not the exposure of error. It is constantly and persistently looking into how truths are produced. That's why deconstruction doesn't say logocentrism is a pathology, or metaphysical enclosures are something you can escape. Deconstruction, if one wants a formula, is among other things, a persistent critique of what one cannot not want. (Spivak 1994: 285)

4.4 The Danger of Assimilation - The converse objection warns that Derrida's account might just redescribe Kuhn's position in more abstract language, effectively assimilating Kuhn's historically grounded thesis into a generalized linguistic theory. However, Derrida offers a distinct insight clarifying the active role of interpretation in constituting, not merely applying, conceptual identities.

Where Kuhn's bilingualism suggests the interpreter learns to use two lexicons as relatively stable entities, Derrida reveals that contextual repetition is not a secondary operation performed after identities are fixed. Instead, each act of repetition or interpretation participates in sustaining and simultaneously transforming those identities (Davis, 2001). This implies that the bilingual interpreter does not reside in a neutral meta-language external to the competing paradigms but navigates between lexicons through historically situated acts of re-description that both preserve and alter meaning.

Therefore, Derrida subtly modifies Kuhn's bilingualism by emphasizing the dynamic, historically mediated nature of conceptual identity maintenance and change. This prevents reducing Kuhn's epistemological account to static vocabulary lists and highlights the interpretive conditions under which scientific lexicons achieve intelligibility despite incommensurability (Sankey, TI, 1998; Davis, 2001).

Through this careful comparison, the dialogue between Kuhn and Derrida illuminates the complex interplay between historical discontinuity and structural conditions of language. We saw how one can preserve their critical differences while recognizing their shared rejection of simplistic models of meaning transfer, thereby articulating a richer conception of transformative interpretation as central to scientific understanding.

5. Transformative Interpretation: A Model of Cross-Paradigm Understanding

5.1 Defining Transformative Interpretation Transformative interpretation can be precisely defined as the historically and conceptually constrained re-inscription of terms from one lexical taxonomy into another interpretive context, enabling partial intelligibility without assuming exact semantic equivalence. This definition captures its essential elements:

Historically constrained: Interpretation is bound by the documented uses and practices of the original period or discourse; it must respond appropriately to historical evidence rather than imposing anachronistic or external meanings.

Conceptually constrained: The process involves reconstructing the network of relations among terms within their original conceptual framework, not merely offering isolated equivalences or rewordings.

Re-inscription: The term enters a new discourse context where it functions differently; it is not just translated but re-installed within a different interpretive framework with altered significance.

Partial intelligibility: Genuine understanding is achieved without full or exhaustive translation; it is sufficient that the terms be intelligible enough for meaningful interpretation.

Non-equivalence: The original semantic or conceptual structure cannot be fully reproduced by straightforward substitution; some elements are inevitably lost or transformed in the process.

Together, these elements foreground that transformative interpretation is a rigorous yet creative act of meaning-making across paradigmatic boundaries, bounded by historical fidelity and conceptual coherence rather than equivalence or assimilation.

5.2 Distinction from Translation Classical or strict models of translation presuppose stable source meanings, corresponding target expressions, preservation of semantic structure, and that content can be transferred independent of context. In contrast, transformative interpretation challenges these assumptions by accepting that:

Meaning arises from relational conceptual identity, not isolated word-for-word equivalence.

It is deeply context-dependent, embedded within distinct historical and theoretical milieus.

It allows only incomplete structural preservation, as conceptual schemes can be incommensurable.

The goal is to explain and elucidate unfamiliar terms and frameworks rather than replace or directly translate them.

Thus, transformative interpretation rejects the notion of a neutral transfer of fixed meanings and embraces a model more suited to engaging fundamentally different paradigms.

5.3 Distinction from Appropriation- Unlike appropriation, which might conflate or assimilate historical science into contemporary categories, transformative interpretation maintains a critical distance,

preserving awareness of:

Semantic loss: Recognizing that some meanings cannot survive the move intact.

Historical difference: Respecting the original context and its distinctiveness.

Unresolved residue: Acknowledging what remains inexplicable or in tension.

Non-equivalent category structures: Identifying that conceptual frameworks differ structurally.

The interpreter's own conceptual standpoint: Being transparent about how present perspectives shape the interpretation.

Thus, while transformative, interpretation must disclose its own transformations and refrain from uncritical absorption or domination of the past by the present.

5.4 Very often, one can find many criticisms in different forms towards Kuhn's and Derrida's thoughts, but in this case, we can suggest that transformative interpretation can serve as a distinction from relativism and could be constrained by four key forms of accountability:

Textual accountability: Interpretations must fit the source texts, terminology, and documented uses precisely.

Historical accountability: They must reconstruct the broader theoretical and practical context of the scientific community involved.

Structural accountability: The relations among the terms must be preserved as much as possible, avoiding isolated or disconnected translations.

Epistemic accountability: Interpretations should remain open to criticism, revision, and evidential correction.

In this model, non-equivalence does not equate to relativism or abandoning standards; it implies bounded flexibility guided by scholarly rigor.

5.5 What is also necessary is to find a criteria by which we can achieve successful interpretation. For example, interpretive success can be evaluated by criteria such as:

Reconstructive accuracy: Faithfulness in recovering original contexts and relations.

Preservation of taxonomic relations: Retaining the network of conceptual interrelations.

Explanatory clarity: Providing comprehensible accounts bridging paradigms.

Recognition of semantic residue: Acknowledging aspects that resist translation.

Sensitivity to historical practice: Attunement to experimental and social practices of the original context.

Capacity to explain both continuity and rupture: Accounting for elements preserved and those transformed or abandoned.

Avoidance of anachronism: Preventing imposition of present categories onto past frameworks.

These criteria endow the model with methodological value, setting standards for evaluating different interpretive approaches, but also align with the ethical dimensions of Kuhn - Derrida framework.

Finnally, we can conclude that their framework practically advances the conceptual tools in the following ways:

-Highlighting that Kuhn's distinction between translation and interpretation must be supplemented with Derrida's insight that interpretation necessarily involves iterative recontextualization (iterability).

-Clarifying that bilingual understanding between paradigms is neither neutral mediation (as strict translation would presuppose) nor unrestricted construction (as radical relativism might allow).

-Emphasizing that such understanding is a situated practice producing intelligibility via controlled and accountable conceptual alteration.

This model articulates the conceptual mechanics underlying paradigm shifts, moving beyond Kuhn's initial formulations to incorporate a more nuanced account of interpretive practice.

The outlined framework of transformative interpretation thus provides a vital conceptual basis for engaging with scientific revolutions and cross-paradigm understanding, integrating historical fidelity, conceptual rigor, and epistemic responsibility into interpretive acts.

The treatment above synthesizes relevant philosophical hermeneutics, deconstruction, and Kuhnian philosophy of science to define and situate transformative interpretation as a rigorous model for cross-paradigm understanding (Alavian, 2025; Davis, 2014; Rugwiji, 2019).

In conclusion, this article has articulated a philosophically rigorous model of cross-paradigm understanding that synthesizes Thomas Kuhn's historically grounded concept of taxonomic incommensurability with Jacques Derrida's structural elucidation of iterability. Kuhn's mature account reveals that incommensurability arises from translation failure among locally defined clusters of interrelated scientific terms embedded in structured lexical taxonomies. This situates communication difficulties as partial, historically contingent, and epistemically meaningful, rather than insurmountable or global. Derrida's notion of iterability complements Kuhn by explaining why any interpretive act necessarily re-inscribes terms within new contexts, making semantic identity both contingent and transformable. Together, these insights expose the limits of strict translation and naive assimilation, instead legitimizing a middle ground of transformative interpretation.

Transformative interpretation emerges as a constrained and accountable practice by which scientific lexicons, though taxonomically incommensurable, can be rendered intelligible across paradigms without collapsing into either exact equivalence or radical unintelligibility. This model demands respect for historical uses, preservation of conceptual relations, openness to epistemic criticism, and transparency about the interpreter's own situated standpoint. It provides criteria for evaluating interpretations, emphasizing reconstructive accuracy, explanatory clarity, historical sensitivity, and avoiding anachronism. Such rigour ensures that cross-paradigm understanding doesn't have to be relativistic or reductive, rather a nuanced and situated negotiation of meaning across conceptual revolutions.

By explicitly addressing the tension between continuity and discontinuity in scientific change, this approach refines and extends Kuhn's original insights with the methodological clarity offered by Derrida's philosophy of language. It thus advances philosophical hermeneutics and translation theory within the philosophy of science, offering a robust framework applicable to historical reconstructions of scientific revolutions. Ultimately, this article demonstrates that understanding across paradigms is a dynamic, transformative process, one that fosters genuine dialogue between differing scientific worlds while acknowledging the irreducible complexity of conceptual change. This enriches our comprehension of scientific innovation, enabling a more faithful and epistemically responsible engagement with the evolution of knowledge.

Declarations

Author Contribution

I.N. wrote the main text and made its review.

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