

Analysis of Semantic, Syntactic, and Pragmatic Adaptations in Urdu Translations of Stephen Hawking's "A Brief History of Time"

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ABSTRACT

This article analyzes the translation strategies employed in rendering Stephen Hawking's *A Brief History of Time* into Urdu, concentrating on semantic, syntactic, and pragmatic adaptations in the translations by Yasir Jawad and Nazir Mehmood. Applying O'Brien's (2012) linguistic framework, the study examines selected excerpts to evaluate how complex technical terminology, cosmological concepts, and the text's explanatory tone are conserved or adapted across languages. The analysis reveals diverse strategies, including neologisms and loanwords, used to balance scientific precision with reader accessibility. The findings highlight the challenges of translating scientific discourse into Urdu, a language with an evolving lexicon, and offer insights into balancing precision with accessibility. This research contributes to translation studies by addressing gaps in the translation of scientific texts into other languages, providing strategies for broad scientific communication.

Keywords: Translation, Strategies, Scientific, Challenges

Introduction

The translation of scientific literature across linguistic limitations presents a reflective challenge, particularly when linking the gap between English, a central language in modern science, and Urdu, a rich yet growing language spoken by millions in South Asia. This study delves into the complex process by examining two Urdu versions of Hawking's pivotal work, authored by Nazir Mehmood and Yasir Jawad. Based on O'Brien's (2012) linguistic framework, the study precisely separates selected excerpts to clarify how translators navigate the intricacies of

technical jargon, cosmological concepts, and the original text's engaging descriptive tone. This study not only highlights the translators' efforts to preserve faithfulness to Hawking's intent but also highlights the broader implications for making progressive scientific ideas reachable to non-English-speaking audiences.

Analysis lies in a comparative evaluation of syntactic, semantic, and pragmatic strategies employed to adapt Hawking's style. Semantic adaptations, for instance, involve the judicious use of loanwords from English to convey accurate scientific terms, while neologisms are created to fill lexical gaps in Urdu's scientific vocabulary. Syntactically, the translators tackle restructuring complex English sentences to align with Urdu's SOV order, often prioritizing precision over literal equivalence. Pragmatically, the study reveals the text's informal, conversational style. Hawking's symbol is modified to resonate with Urdu readers' cultural expectations, balancing scientific precision with legibility. Through this lens, the article discovers the intrinsic rigidities in translating a work that illuminates black holes, quantum mechanics, and the Big Bang for lay readers, demonstrating how such adaptations can either enhance understanding or introduce ambiguities.

Ultimately, the findings of this research illuminate the unique challenges posed by Urdu's script, syntax, and lexicon in scientific translation, a domain where accuracy is dominant yet accessibility remains subtle. By addressing these challenges, the article contributes meaningfully to translation studies, filling a prominent gap in scholarship on non-Western languages and scientific discourse. It advocates for advanced strategies that promote comprehensive knowledge dissemination, ensuring that innovative ideas, such as those in Hawking's masterpiece, transcend linguistic barriers. In doing so, the study not only enhances our understanding of cross-cultural scientific communication but also invites further investigation into how translators can foster international logical impartiality in an increasingly interconnected world.

How do semantic, syntactic, and pragmatic strategies balance scientific accuracy with cultural and linguistic accessibility in *A Brief History of Time* by Stephen Hawking and its selected Urdu Translations?

Balancing Scientific Accuracy and Cultural/Linguistic Accessibility in Urdu Translations of *A Brief History of Time* by Stephen Hawking

Literature Review

Scientific translation, particularly in rendering complex works such as Stephen Hawking's *A Brief History of Time*, plays a pivotal role in bridging knowledge across linguistic and cultural boundaries. Scientific texts, including those in physics, mathematics, cosmology, and other specialized domains, are distinguished by their precision, objectivity, and adherence to universal conventions of communication. As Krein-Kutiile (2003) notes, scientific translation has historically been essential for global knowledge dissemination, enabling the transfer of scientific and technological advancements between nations. In the context of Urdu, this role is heightened by the need to convey highly technical concepts to an audience whose linguistic and cultural frameworks may differ substantially from those of the source language.

Scientific discourse is characterized by a standardized rhetorical structure and systematic presentation of facts, theories, and experimental procedures (Remache, 2013; Rundle, 2022). Its communicative value depends on coherence, consistency, and the use of language for specific purposes (LSP), which distinguishes it from literary expression (Ahmad, 2012). Features such as technical terminology, passive constructions, and impersonal tone are integral to maintaining scientific credibility (Byunga, 2018). Translators working with scientific discourse must therefore navigate challenges such as preserving conceptual accuracy, respecting genre conventions, and adapting to the target audience's linguistic and cultural realities (Ilynska et al., 2016). These challenges are particularly acute in Urdu translations of cosmological texts, where specialized terms may lack direct equivalents and require strategies such as transliteration, cultural substitution, or paraphrasing.

Scholars such as Reiss emphasize that translations of scientific texts must provide complete and direct access to the conceptual content of the source, balancing literal accuracy with functional clarity for the target readership (Ilynska et al., 2016). Byrne (2006) further highlights the translator's dual role as both linguistic mediator and communicator, requiring a deep understanding of the subject matter, precision in terminology, and sensitivity to rhetorical and stylistic norms. The rendering of scientific works like Hawking's demands not only mastery of semantic transfer but also syntactic and pragmatic adaptations to preserve the logical flow and

explanatory tone of the original. This involves decisions on whether to expand, reduce, or restructure information to maintain readability without compromising scientific rigor.

In the case of *A Brief History of Time*, these principles take on added significance due to the text's dual nature as both a work of popular science and a dense exposition of astrophysical theory. Translators into Urdu must strike a careful balance between technical fidelity and accessibility, ensuring that cosmological concepts such as singularities, relativity, and gravitational collapse are communicated with both scientific precision and cultural intelligibility. This necessitates refined strategies at the semantic level, choosing between loanwords and indigenized terms; at the syntactic level, managing sentence complexity; and at the pragmatic level, maintaining coherence and cohesion to guide readers through abstract concepts. As this literature suggests, refining translation strategies for scientific discourse is essential to ensure that such works not only cross linguistic boundaries but also resonate meaningfully within their new cultural and intellectual contexts.

The challenges of scientific translation take on a particularly intricate dimension. Scientific discourse, though guided by universal standards of clarity, objectivity, and precision, often contains specialized terminologies, complex syntactic structures, and culturally embedded concepts that lack direct equivalents in Urdu. The rendering of Hawking's cosmological concepts into Urdu requires translators to navigate issues of terminological inconsistency, neologism creation, and polysemy, especially as modern astrophysics continues to introduce new terms and theories at a rapid pace. Strategies such as calque, borrowing, and paraphrasing become indispensable for maintaining conceptual accuracy while ensuring readability for a target audience unfamiliar with specific scientific registers. Moreover, English scientific writing's preference for nominalization and passive constructions often demands syntactic restructuring in Urdu, which favors more verb-based and active sentence structures. This restructuring must be executed without distorting the source text's intended meaning or weakening its rhetorical force.

The cultural and rhetorical dimensions of translation further complicate the

adaptation of *A Brief History of Time* into Urdu. Scientific texts in English tend toward direct argumentation and minimal hedging, whereas Urdu's rhetorical norms may favor oblique phrasing and nuanced exposition. Translators must therefore make strategic choices between domestication, which prioritizes fluency and cultural familiarity, and foreignization, which retains the source text's scientific precision and foreign conceptual framing (Venuti, 2008). Maintaining accuracy and coherence also requires terminological consistency throughout the translation, a challenge compounded by the evolving nature of scientific knowledge and the absence of standardized equivalents in Urdu. Pragmatically, the translator must ensure cohesion between highly abstract ideas, guiding the reader through theoretical constructs that are unfamiliar yet central to the narrative. By integrating semantic precision, syntactic adaptation, and pragmatic coherence, the translation can preserve both the intellectual rigor of Hawking's work and its accessibility for Urdu-speaking audiences, ultimately fulfilling the dual role of linguistic fidelity and effective knowledge dissemination.

Hawking's book addresses philosophical and metaphysical issues regarding the nature of the universe in addition to being a scientific work. The study by Zhang et al. (2025) investigates how "*A Brief History of Time*" gives scientific ideas utilizing cultural references. Concepts like quantum mechanics and space-time relativity need precise translation to maintain the scientific meaning whilst ensuring they are understandable to readers unfamiliar with Western scientific traditions. Newmark's (2010) translation model has been applied in studies of *A Brief History of Time* to classify and examine culture-specific items (CSIs). This model helps in recognizing terms that require translation strategies, such as cultural equivalence, descriptive equivalence, and transference, to bridge linguistic gaps effectively (Zhang et al., 2025). There was not just *Hawking's* book, but there were some other popular books as well. The 1970s and 1980s had seen a string of best-selling popular physics books, from Fritjof Capra's 1975, "*The Tao of Physics*" to Steven Weinberg's 1977, "*The First Three Minutes*", "*Carl Sagan's Cosmos*" (1980), and James Gleick's *Chaos*" (1987). Hawking's book changed people's ideas about popular science. To accomplish success, US and UK publishers in the late 1980s and early 1990s invested in this group.

Books by Steven Pinker and Jared Diamond sold quickly, as did books by well-known popularizers like Stephen Jay Gould and Richard Dawkins.

In the context of this study, *Refining Translation Strategies for Scientific Discourse in Urdu: A Comparative Study of Semantic, Syntactic, and Pragmatic Adaptations in Urdu Translations of Stephen Hawking's "A Brief History of Time"*, the implications of translation choices in scientific discourse become especially significant. Hawking's work contains highly specialized cosmological terminology, intricate syntactic structures, and culturally embedded conceptual frameworks that often lack direct Urdu equivalents (Nida, 1964; Byrne & House, 2007). The translators of this text must navigate between borrowing, calquing, coining neologisms, and paraphrasing to preserve conceptual precision while ensuring accessibility for Urdu-speaking readers (Maksymenko et al., 2023; Al-Smadi, 2022). This challenge is heightened by the prevalence of dense nominalizations, extended passive constructions, and complex clause structures in the source text, which require syntactic restructuring to align with Urdu's more verb-oriented sentence patterns without distorting the original meaning (J.R. Martin, 1993; Koletnik, 2013). The rhetorical style of the source, often characterized by direct argumentation and scientific objectivity, also interacts with Urdu's stylistic and cultural conventions, which may favor nuanced exposition and implicit reasoning (Remache, 2013). As a result, the translator's decisions directly influence the accessibility, accuracy, and rhetorical force of Hawking's scientific ideas for the target audience. Rashid researched exploring semantic and pragmatic shifts in English to Urdu lexical borrowing. The study demonstrates that lexical borrowings undergo semantic shift and pragmatic adaptation depending on cultural usage and audience familiarity (Rashid, 2025)

Moreover, the translation of *A Brief History of Time* into Urdu demonstrates how cultural and epistemological considerations can shape the adaptation of scientific metaphors, idioms, and explanatory analogies (Rundle, 2022; Ilynska et al., 2016). Certain metaphysical concepts in astrophysics, expressed in English through metaphorical language (e.g., "fabric of space-time"), require careful negotiation between literal retention, cultural adaptation, or explanatory rephrasing to ensure

both accuracy and reader comprehension (Venuti, 2008; Newmark, 1988). The absence of standardized Urdu equivalents for many scientific terms introduces risks of terminological inconsistency, which can affect the coherence of the translated work and hinder knowledge dissemination (Muhammad Bello & Abubakar Muhammad, 2023). Drawing on equivalence-oriented approaches (Darbelnet, 1995; Jakobson, 1959), translators must balance fidelity to Hawking's original scientific discourse with fluency in the target language, ensuring that the translation preserves the conceptual integrity and pragmatic coherence of the source (House, 1977; Anari & Hamid, 2016). By applying strategies that integrate semantic precision, syntactic adaptation, and pragmatic cohesion, the Urdu translations can serve not only as linguistic renditions but as vehicles for expanding scientific literacy and bridging knowledge gaps between English-speaking and Urdu-speaking communities. Khan (2025) researched the semantic processing of Urdu, which stresses the complexity of Urdu as a morphologically rich language. He demonstrates that semantic representation in Urdu requires widespread reformation to maintain precision while ensuring fluency (Khan et al., 2025).

Research Methodology

The data selected for the present research is an English scientific work, *Hawking's "A Brief History of Time,"* and its two Urdu translations by Yasir Jawad and Nazir Mehmood. The source text was bought from the University of Gujrat's book fair, and the translated texts were downloaded from Scribd.

The research framework used in this research is O'Brien's linguistic analysis of scientific discourse at the syntactic, semantic, and pragmatic levels. Sharon O'Brien (2012) emphasizes the importance of linguistic analysis at different levels in translation studies, particularly when combining qualitative and quantitative approaches. She emphasizes that, in addition to superficial characteristics, linguistic analysis should take deeper discursive and contextual factors into account. In order to analyze the data, this study uses O'Brien's linguistic analysis of scientific discourse at the semantic, syntactic, and pragmatic levels. At the syntactic level, the researcher concentrates on grammatical shifts and sentence structure that may influence the flow and comprehension of scientific notions. Here, the aim is to find shifts and grammatical patterns that might impact meaning while translating. At the semantic

level, the primary focus is on analyzing how particular scientific concepts are presented in the source text and their translated equivalents. The accuracy and effectiveness of translations in communicating intricate scientific concepts would be easier to understand as a result. Finally, the pragmatic level emphasizes how cultural and contextual elements impact the translation of scientific discourse, particularly in terms of taking into consideration the audience's linguistic expectations and past knowledge in Urdu. With this multi-level methodology, the researcher aims to evaluate the difficulties and efficacy of translating scientific discourse by closely examining and contrasting the linguistic subtleties of Hawking's original text with its Urdu translations. At the syntactic level, Mona Baker's strategies are applied, i.e., neutral word, cultural substitution, paraphrasing, loan words, and deletion. At the syntactic level, the strategy of expansion and reduction is applied. Moreover, lastly, the coherence and cohesion strategy is applied at the pragmatic level. Methodology focuses on addressing challenges in scientific discourse, such as cultural adaptation and lexical gaps. In the comparative analysis, the evaluation of Yasir Jawad and Nazir Mehmood is involved.

This framework is linked with this research in a way that O'Brien highlights the structured and logical nature of scientific writing; this study applies it by analyzing how Urdu translators employ expansion or reduction to manage Hawking's dense sentence structures at the syntactic level. At the semantic level, O'Brien stresses precision in terminology; the translations reflect this through strategies such as paraphrasing, borrowing, or simplifying technical terms to balance accuracy with accessibility. At the pragmatic level, O'Brien emphasizes coherence and cohesion; the Urdu versions demonstrate this in their handling of logical connectors and explanatory additions to guide readers.

Data Analysis

Excerpt#1: Linguistic Analysis at Pragmatic Level

ST:

Our present ideas about the motion of bodies date back to Galileo and Newton. Before them, people believed Aristotle, who said that the natural state of a body was to be at rest and that it moved only if driven by a force or impulse. It followed that a heavy body should fall faster than a light one, because it would have a greater pull

toward the earth.

TT₁

Ijsam ki harkat k mutaliq hmary majooda khayalat Galileo aur Newton k dor se chly aa rhy hai. Un se pehly logou ko Arastou pr yaqeen tha jis ne kaha k sakoon kisi jism ki fitri khalat hoti hai aur yeh kisi quwat ya muhraq ki waja se hi harkat karta hai. Is ka mtlab hua k bhari jism hlky jism ki ba-nisbat zyada tezi se giry ga, kyuk zameen isy zyada zor k sath apni janib khenchy gi.

TT₂

Ijsam ki harkat k bary me hmary majooda khayalat Galileo aur Newton se chly aa rhy hai. Un se pehly log Arastou pr yaqeen rakhty thy, jis ka kehna tha k jism ki fitri halat sakooni hoti hai tawftiqy k isy koi quwat ya muhraq harkat na dy. Mazeed yeh k aik bhari jism ahista rawi ki nisbat tezi se giry ga kyuk zameen ki janib is ka khinchao zyada ho ga.

In TT₁, coherence is attained by retaining the same step-by-step order as the source. The first sentence establishes continuity from Galileo and Newton, followed by the introduction of Aristotle, and concludes with the reasoning behind his claim. The cohesive device “Un se pehly” effectively signals the temporal contrast, while “Is ka mtlab hua” provides a causal link to the final sentence. However, this insertion shifts the rhetorical stance: rather than reporting Aristotle’s belief neutrally, it presents the statement as if the translator were concluding. This enhances readability for general audiences, but it slightly alters the pragmatic force of the source. Cohesion is otherwise well maintained, with lexical repetition of “jism” and “harkat” reinforcing textual unity.

TT₂ also maintains overall coherence by presenting the same sequence of ideas, but the connectors employed shape a different pragmatic effect. The use of “Un se pehly” again marks temporal contrast, but the addition of “Mazeed yeh k” creates a conversational tone that weakens the scientific neutrality of the source. Cohesion is preserved through consistent lexical items such as “jism” and “quwat,” though the heavy phrasing “tawftiqy k isy koi quwat ya muhraq harkat na dy” interrupts the fluency of the text, thereby affecting readability. Nevertheless, TT₂’s phrasing “zameen ki janib is ka khinchao zyada ho ga” offers a more accurate semantic equivalent for gravitational pull, pragmatically enhancing its effectiveness for a

scientifically aware audience.

Both translations achieve coherence by following the logical progression of the source, and they maintain cohesion through the use of temporal and causal markers as well as lexical repetition. TT1 privileges accessibility and ease of comprehension, while TT2, despite its occasional awkwardness, comes closer to preserving the scientific nuance of the original. At the pragmatic level, this shows a contrast in strategy: one leaning toward readability through explanatory cohesion, the other toward scientific precision through conceptual coherence.

Excerpt#2: Linguistic Analysis at the Syntactic Level

ST

In fact, it is not really consistent to treat light like cannonballs in Newton's theory of gravity because the speed of light is fixed. (A cannonball fired upward from the earth will be slowed down by gravity and will eventually stop and fall back; a photon, however, must continue upward at a constant speed. How then can Newtonian gravity affect light?) A consistent theory of how gravity affects light did not come along until Einstein proposed general relativity in 1915. And even then, it was a long time before the implications of the theory for massive stars were understood.

TT1

Darhakeekat tajazab k mutaliq Newton ki theory me roshni ko top k golou ki tarah lena mawafaqat nhi rakhta kyuk roshni ki raftar muqarar h (Zmeen se upper ki taraf fire kia gya gola tajazab ki waja se sust parh jaye ga aur injam kar ruk kr wapis girye ga; taham aik photon mustaqil raftar pr upper ki taraf hi jata rhy ga. To phir Newtony tajazab roshni pr kese asar andaz hota hai?) Tajazab k roshni pr asar andaz hone k mutaliq aik marboot theory us waqt I jb Einstein ne 1915 me nazriya amoomi izafiyat pesh kia kia. Aur hata k us waqt b nuheeb sitarou k liye theory k muzmirat ko smjne me abi taweel arsa baki tha.

TT2

Darhakeekat Newton k nazriya tajazab me rshni ko top k golou ki tarah smjna munasib nhi, kyuk roshni ki raftar muqarar h (zameen se upper ki taraf fire kia jane wala top ka gola tajazab k asar ki waja se sust ho jaye ga aur akhirkar ruk kr neechy girne lgy ga, taham aik photon muqarara raftar se upper jata rhy ga. Phir Newton ka tajazab roshni ko kis tarah mutasir kry ga?) Tajazab k roshni pr asar ka munasib

nazriya sirf usi waqt mila, jb 1915 me Eistein ne amoomi izafiyat ka nazriya pesh kia aur us k bd b aik arsy tk bohat wazni sitarou k liye, us nazriye ka itlaq smja na ja ska.

The source text begins with a syntactically complex sentence that combines assertion and contrast: “In fact, it is not really consistent to treat light like cannonballs in Newton’s theory of gravity because the speed of light is fixed.” TT1 closely follows the syntactic construction, though with slight **expansion**, rendering “it is not really consistent” as “*mawafaqat nhi rakhta*,” which carries the intended meaning but loses some modal subtlety. TT2, however, uses a more natural and **reduced** structure, “*munasib nhi*,” making the expression more accessible without compromising accuracy. Both versions correctly render the causal clause “because the speed of light is fixed,” preserving semantic integrity and syntactic alignment.

In the parenthetical explanation, the original contrasts the physical behavior of cannonballs and photons. TT1 expands the clause “a photon, however, must continue upward at a constant speed” into “*taham aik photon mustaqil raftar pr upper ki taraf hi jata rhy ga*,” adding repetition (“*hi*” and “*upper ki taraf*”) to emphasize direction. TT2 renders it more economically with “*muqarara raftar se upper jata rhy ga*” using a **reduced** yet accurate structure that improves readability.

The following sentence introduces Einstein’s theory: “A consistent theory...did not come along until Einstein proposed general relativity in 1915.” TT1 maintains syntactic proximity, but slightly **expands** with “*theory us waqt i jb...*” TT2 also mirrors this, yet its use of “*munasib nazriya sirf usi waqt mila*” reflects a **reduced**, smoother construction. Finally, the clause “And even then it was a long time...” is translated in TT1 with “*Aur hata k us waqt b*,” a formal structure that enhances textual coherence. TT2 simplifies this with “*aik arsy tk aur us k bd*,” achieving better readability through syntactic reduction.

Overall, both translations are accurate, but TT2 shows better syntactic economy and improved flow. TT1 tends toward slight syntactic expansion, which maintains fidelity but affects fluency. TT2’s balance between reduction and clarity makes it more effective for general readers without compromising the scientific precision.

Excerpt#3: Linguistic Analysis at the Semantic Level

ST

In 1965, I read about Penrose's theorem that anybody undergoing gravitational collapse must eventually form a singularity. I soon realized that if one reversed the direction of time in Penrose's theorem, so that the collapse became an expansion, the conditions of his theorem would still hold, provided the universe were roughly like a Friedmann model on large scales at present. Penrose's theorem had shown that any collapsing star must end in a singularity; the time-reversed argument showed that any Friedmann-like expanding universe must have begun with a singularity. For technical reasons, Penrose's theorem required that the universe be infinite in space. So I could, in fact, use it to prove that there should be a singularity only if the universe were expanding fast enough to avoid collapsing again (since only those Friedmann models were infinite in space).

TT₁

1965 me mein ne penrose k theorem k bary me prha k tajazabi inhadam se guzarney wala koi jism anjamkar aik singularity tashqeel dy ga. Me ne jald hi mehsoos kia k agar ap penrose k theorem me waqt ki simt ult dy aur inhadam aik phelao me badal jaye to us k theorem ki sharait badastoor qayim rhy gi, bashart yeh k kainat majooda waqt me bry pamanou pr Friedman k model jesi hoti. Penrose k theorem ne dikhaya tha k koi b munhadim hone wala sitara aik singularity pr muntahib ho ga; waqt ko ultane wali daleel ne dikhaya k koi b Friedman numa phelti hui Kainat aik singularity se hi shuru hoti ho gi. Taqniki wajoooh ki bina pr Penrose ka theorem taqaza krta tha k kainat space me la-mutnahi ho. So me ne darhakeekat is ki madad se sabit kia k aik singularity tabhi ho ga jb kainat itni tezi se phel rhi ho k wapis inhadam se bach jaye (kyuk sirf Friedman waly model hi space k aitbar se lamutnahi thy).

TT₂

Mein ne 1965 me Penrose k nazriye k bary me prha tha k tajazab se dher hota hua koi b jism bilakhir aik akayyat tashkeel deta hai. Mjhy jld hi yeh andaza ho gya k agr Penrose k nazriye me waqt ki simt ko ult dia jaye ta k us ka dher hona phelny me badal jaye to us nazriye ki shrayit b barkarar rhy gi, bashart yeh k majooda waqt me bry pemane pr kainat taqreeban Friedman namoone jesi ho. Penrose k nazriye ne yeh

btaya tha k koi b dher hota hua sitara bilakhir aik akayyat pr khatam ho ga. Zaman makoos wali daleel ne zahir kia tha k koi Friedman qisam ki phelti huyi kainat zaroor aik akayyat se agaz hoti ho gi. Taqniki wajooahat ki bina pr Penrose ka nazriya is bt ka mutqazi tha k kainat makaa me lamutnahi ho, is tarah me isy yeh sabit krne k liye istamal kr skta tha k akayyat mehz us soorat me ho gi jb kainat itni tezi se phel rhi ho k dubara dher hone se bach sky (chyuk sirf Friedman hi k model me makaa lamutnahi tha).

In TT1, the phrase “tajazabi inhadam” for gravitational collapse shows a strategy of paraphrasing, as the translator combines “tajazab” (gravity) with “inhadam” (collapse) to create a compound, rather than using a loan or single lexical equivalent. Similarly, “singularity” is retained as a loan word, signaling a lack of a naturalized Urdu equivalent but preserving scientific accuracy. For the Friedmann model, the translator chooses to retain the name unchanged, again applying a loan strategy. The expression “waqt ko ultane wali daleel” is a paraphrase of a time-reversed argument, showing the translator’s attempt to explain rather than replicate technical phrasing. The result is semantically accurate but sometimes heavy, slightly reducing readability.

In TT2, semantic choices shift toward accessibility. The word “dher hota hua” replaces collapse, a more neutral and colloquial description, which makes the concept easier to grasp but less precise in technical terms. “Akaayyat” is used consistently for singularity, again a loan adaptation, though with a more naturalized Urdu form, which enhances readability. The rendering of “zaman makoos wali daleel” is a more literal attempt at a time-reversed argument, and while semantically close, it risks awkwardness in Urdu expression. For implications, TT2 reduces the nuance to “istamal krne k liye” or “zaroor aik akayyat se agaz hoti ho gi,” where depth is lost through semantic reduction.

Overall, TT1 shows higher accuracy by preserving technical precision through paraphrasing and direct loans, though at the cost of readability due to heavy phrasing. TT2, by contrast, favors semantic simplification through neutral words and paraphrasing, which increases accessibility and effectiveness for a broader audience but slightly dilutes the scientific rigor of the source. Both translations demonstrate different semantic strategies, reflecting a balance between scientific

accuracy and pragmatic readability.

Findings

The findings of this research confirm that translating scientific discourse into Urdu, particularly a text as conceptually condensed as *A Brief History of Time*, demands not only linguistic faithfulness but also cultural and linguistic sensitivity. The comparative analysis of Yasir Jawad and Nazir Mehmood's translations highlights that the accomplishment of scientific translation depends on the translator's capability to negotiate between technical accuracy and reader accessibility. While one translation favors transliteration and formal equivalence to retain terminological precision, the other leans toward paraphrasing and cultural substitution to enhance conceptual clarity. At the syntactic level, strategies of expansion and reduction influence sentence flow and readability, with reduced structures often yielding smoother, more digestible renditions. Pragmatically, cohesion and coherence are critical to preserving the explanatory logic of the source, and variations in tone, register, and connective devices reveal how different interpretive strategies affect comprehension. Ultimately, this study underscores the importance of refining translation strategies to meet the dual demands of scientific integrity and linguistic inclusivity. The translators' nuanced choices not only shape the reception of scientific knowledge in Urdu but also contribute to the broader aim of democratizing science by making it intelligible and resonant across linguistic and cultural boundaries.

Conclusion

The analysis of semantic, syntactic, and pragmatic adaptations in the Urdu translations of *A Brief History of Time* shows that rendering scientific discourse into Urdu involves a constant negotiation between precision and accessibility. By applying O'Brien's framework, this study demonstrates how translators use strategies such as loanwords, paraphrasing, expansion, and reduction to manage dense terminology, complex sentence structures, and explanatory logic. Nazir Mehmood's version tends to preserve technical accuracy through transliteration and formal constructions, while Yasir Jawad often privileges readability by simplifying syntax and adopting more neutral or familiar lexical choices. Pragmatically, both employ cohesion and coherence but differ in tone, one leaning toward scientific

neutrality, the other toward explanatory accessibility. Together, these findings highlight the pivotal role of translation in mediating advanced scientific ideas for Urdu-speaking audiences, not only bridging linguistic gaps but also contributing to the democratization of scientific knowledge in culturally resonant ways.

Building on the insights of this study, future research should further explore the translation of scientific discourse in underrepresented languages like Urdu by incorporating a wider range of scientific texts and translators to identify broader patterns and evolving practices. There is a need for more interdisciplinary collaboration between translators, scientists, and linguists to develop standardized terminologies and culturally sensitive strategies that ensure both accuracy and accessibility. Future studies may also benefit from examining reader reception and comprehension to assess how effectively scientific ideas are being communicated across linguistic barriers. In addition, longitudinal studies could investigate how scientific vocabulary in Urdu evolves through translation, education, and policy intervention. Comparative analyses involving translations into other regional or global languages may also shed light on how cultural context shapes scientific understanding and terminology. Emphasizing the importance of pedagogical application, future research should consider how translated scientific texts can be effectively integrated into science education in Urdu-medium institutions, ultimately contributing to greater scientific literacy and equitable knowledge dissemination.

References

- Ahmad, J. (2012). *Stylistic Features of Scientific English: A Study of Scientific Research Articles*. 2(1), 47–55. <https://doi.org/10.5539/ells.v2n1p47>
- Al-Smadi, H. M. (2022). Challenges in Translating Scientific Texts: Problems and Reasons. *Journal of Language Teaching and Research*, 13(3), 550–560. <https://doi.org/10.17507/jltr.1303.11>
- Anari, S. M., & Hamid, V. (2016). House's Newly Revised Translation Quality Assessment Model in Practice: A House's Newly Revised Re vised Translation Quality Assessment Model in Practice: A Case Study 1. *Translation Studies*, 13(January 2016).
- Byrne, J. (2006). *Usability strategies for translating technical documentation*. Springer.

- Byrne, J., & House, J. (2007). *Byrne, Jody (2006). January 2006–2008.*
- Darbelne, J. P. V. & J. (1995). *J.P. Vinay & J. Darbelne.*
- House, J. (2015). *Translation quality assessment: Past and present.* Routledge.
- Ilynska, L., Ivanova, O., & Senko, Z. (2016). Rhetoric of Scientific Text Translation. *Procedia - Social and Behavioral Sciences*, 231(May), 84–91. <https://doi.org/10.1016/j.sbspro.2016.09.075>
- J.R.Martin, M. H. (1993). *Writing Science: Literacy and Discursive Power.* The Falmer Press.
- Jakobson, R. (1959). On linguistic aspects of translation. *Harvard University Press.*
- Khan, M., Javed, A., & Ali, R. (2025). Semantic processing for Urdu: Corpus creation, parsing, and generation. *Language Resources and Evaluation*, 59(2), 233–250. <https://doi.org/10.1007/s10579-025-09819-2>
- Koletnik, M. (2013). Translation in Foreign language teaching.
- Maksymenko, L., Shostak, U., Trebyk, O., Kostyk, Y., & Malynka, Y. (2023). Features of Translating Scientific Texts into English. *World Journal of English Language*, 13(5), 514–519. <https://doi.org/10.5430/wjel.v13n5p514>
- Muhammad Bello, I., & Abubakar Muhammad, A. (2023). The challenges of translating scientific and technical terms from English into Fulfulde. *Translatology, Translation and Interpretation - Toward a New Scientific Endeavor*, 1–19. <https://doi.org/10.5772/intechopen.1003206>
- Newmark, P. (1988). *A textbook of translation.* Prentice Hall.
- Nida, E. A. (1964). *Towards a Science of Translating-Nida.Pdf* (p. 29). https://www.researchgate.net/publication/344434491_Application_of_Eugene_Nida's_Theory_of_Translation_to_the_English_translation_Full_Article
- O'Brien, S. (2012). Towards a dynamic quality evaluation model for translation. *The Journal of Specialised Translation*, 17, 55–77.
- Rashid, F. (2025). Transcultural transformations: Exploring semantic and pragmatic shifts in English to Urdu lexical borrowings within social contexts. *Russian Law Journal*, 13(2), 145–160. <https://www.russianlawjournal.org/index.php/journal/article/view/3970>
- Remache, A. (2013). The universality of scientific discourse. *International Journal of*

Online ISSN

3007-3197

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3007-3189

<http://amresearchreview.com/index.php/Journal/about>

English Language Teaching, 1(2), 37-52.

Rundle, F. Z. (2022). *The Routledge handbook of translation and methodology*. Routledge Taylor and Francis.

Venuti, L. (2008). *The translator's invisibility: A history of translation* (Vol. 2). Routledge.

Zhang, X., Halim, H. A., & Hoon, A. L. (2025). *Translation of Cultural Specific Items in Hawking's A Brief History of Time: From the Big Bang to Black Holes*. 23, 3591–3606.