Translation Studies

CONCEPTUAL FOUNDATIONS AND RESEARCH SCENARIOS IN SCIENTIFIC TRANSLATION[1]

Daniel DEJICA
Politehnica University Timisoara, Romania

e-mail: daniel.dejica@upt.ro

Abstract

Scientific translation plays a crucial role in the global circulation of knowledge, yet it remains significantly underrepresented and insufficiently theorised within contemporary Translation Studies. This article positions scientific translation as a distinct field grounded in genre-based analysis, epistemic discourse and technologically mediated scholarly communication. Drawing on previous work on scientific and technical translation (Dejica 2020, in press-a) and on a large-scale review of Romanian doctoral research in translation studies (Dejica, Pungă, Badea & Vîlceanu, 2022), the study identifies a persistent mismatch between the communicative centrality of scientific discourse and its marginal presence in doctoral-level inquiry. To address this gap, the article proposes a comprehensive conceptual framework structured around eight interrelated elements—type of study, approach, method, theory, domain, genre, medium and technology—and anchored in Translation-Studies theories such as Skopos/Functionalism, Descriptive Translation Studies/Polysystem, Interpretive Theory, Relevance Theory, Translational Action, and competence frameworks including PACTE and EMT. The framework is operationalised through ten research scenarios designed to advance empirical, genre-informed and technologically aware investigations into scientific translation. These scenarios address core features of scientific communication, including argumentation and claim construction, hedging and modality, terminological and conceptual systems, multimodal scientific discourse, accessibility and reader-effort, multilingual citation practices, cross-disciplinary genre variation and the professional ecology of scientific translation. Each scenario concludes with an explicit added-value statement, highlighting its methodological contribution and potential relevance to doctoral training, editorial practice and scientific-communication policy. By integrating conceptual clarity with scenario-level specificity, the article offers a structured research agenda intended to support the systematic development of scientific translation as a rigorous, autonomous and socially relevant field within Translation Studies, while acknowledging the Romanian research landscape as its initial empirical context.

Keywords: Scientific translation; Genre analysis; Research framework; Translation-Studies theories; Scientific communication; PhD research scenarios.

1. Introduction

Scientific translation has become an increasingly prominent yet insufficiently theorised area within contemporary translation studies, despite its central role in today's global circulation of knowledge. While the past decades have produced a substantial body of research on specialised (LSP) translation (Gerzymisch-Arbogast, 2008), much of it has traditionally treated

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scientific and *technical* translation as a unified field—both in professional practice and in scholarship (Dejica, 2020). This longstanding conflation can be traced to historical usage, language-teaching traditions and institutional classifications, all of which contributed to the perception of science and technology as a single communicative domain, thereby obscuring important genre-based differences between the texts associated with each field (Dejica, in press-a).

Genre knowledge (Swales, 1993; Bhatia, 1993) offers a clear methodological pathway toward such a delimitation. Scientific genres—including research articles, abstracts, methodological descriptions, theses, dissertations and conference presentations—are built around the dissemination of research-based knowledge within epistemic communities. Their rhetorical organisation, argumentation structures, citation practices and use of hedging distinguish them fundamentally from other specialised genres (Dejica, 2020; Dejica, in press-a), and these features have been documented extensively in genre studies and LSP translation research (Trosborg, 2000; Dejica, 2011). A systematic genre-level distinction thus supports more accurate classification, more appropriate training practices and more nuanced methodological approaches in translation research. Although earlier work has demonstrated the applicability of genre analysis to LSP translation broadly, very few studies have undertaken a dedicated exploration of scientific translation as a research field in its own right (Montgomery, 2010; Dejica, in press-a).

This lack of dedicated scholarship becomes particularly visible when examining doctoral research trends. A comprehensive study of 220 Romanian doctoral theses in translation studies reveals that scientific translation is strikingly underrepresented in the Romanian doctoral research landscape: only two theses across nearly three decades focus explicitly on scientific translation, despite the centrality of scientific communication in academia and the sciences (Dejica, Pungă, Badea & Vîlceanu, 2022). By contrast, research on literary translation, contrastive linguistics or general translation theory dominates the corpus, highlighting a significant gap between the actual communicative needs of multilingual research environments and the thematic orientations of doctoral-level inquiry. The absence of robust doctoral research in scientific translation signals not only a conceptual under-exploration of the field but also a missed opportunity to align scholarly investigation with the evolving demands of knowledge production in a globalised and increasingly digital academic ecosystem (Dejica, in press-b).

At the same time, scientific communication itself is undergoing a profound transformation. Digital publishing platforms, preprint repositories, multimodal dissemination formats, increasing interdisciplinarity and the widespread adoption of AI-assisted writing and translation tools all reshape how scientific knowledge is produced, shared and evaluated (Byrne 2012; Dejica & Dejica-Carțiș, 2020). These developments demand new translation competencies—ranging from the management of epistemic integrity during post-editing to the nuanced handling of rhetorical structures across languages and disciplinary cultures (Pașcalău, 2023). Competence frameworks developed within Translation Studies, such as PACTE (2003) and EMT (2022), gain particular relevance in this context, as they specify the technological, documentary and ethical components required for responsible scientific translation. Additionally, such developments open new research avenues involving cognitive processing, rhetoric, scholarly communication studies, technological mediation and research ethics (Dejica, Eugeni & Dejica-Carțiș, 2020).

Against this backdrop, the present article approaches scientific translation as a type of LSP translation situated at the intersection of genre studies, epistemic rhetoric and technologically mediated scholarly communication. Building on previous work on contemporary shifts in LSP translation (Dejica, in press-a), on a meta-study of doctoral research trends (Dejica, Pungă, Badea & Vîlceanu, 2022), and in line with similar research for technical translation (Dejica, in press-b), this study proposes a set of research orientations, conceptual

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tools and methodological scenarios to support the systematic development of scientific translation as an autonomous research domain. In particular, a conceptual framework is centred around eight elements—type of study, approach, method, theory, domain, genre, medium and technology—and operationalised through ten research scenarios tailored to scientific translation. While the analyses and scenarios are grounded in the Romanian research landscape and institutional practices, the framework and methods are designed to be portable and replicable across contexts, with adaptations to local disciplinary, editorial and technological conditions.

By articulating these foundations, the article seeks to provide a clearer conceptual delimitation and a structured research agenda for scientific translation. It argues for its recognition as an autonomous subdiscipline within LSP translation and highlights its importance for training, research innovation and the integrity of scientific communication in multilingual contexts.

2. Defining Scientific Translation: A Genre-Based and Epistemic Perspective

Scientific translation constitutes a distinct and well-defined area within LSP translation, grounded in the epistemic orientation of scientific communication and the genre-specific conventions through which scientific knowledge is produced and disseminated. As presented in Dejica (in press-a), scientific texts form a coherent family whose primary communicative purpose is the transmission of research-based information to academic and professional scientific communities. Their translation requires the integration of linguistic, rhetorical and discourse-analytical competences in order to preserve the logic of scientific inquiry and the integrity of scientific argumentation across languages.

Building on this initial delineation, scientific translation can be further understood within the broader landscape of LSP translation. Rather than being defined by disciplinary domain alone, it is shaped by the communicative aims and discourse practices that characterise scientific activity. Scientific genres—such as research articles, abstracts, theses, dissertations, research reports and conference presentations—serve to articulate hypotheses, justify methodologies, present empirical findings and integrate new insights within established disciplinary traditions. As Dejica (in press-a) argues, these genres function as instruments of scientific reasoning and as vehicles for knowledge circulation, embedding specific norms, values and rhetorical expectations within specialised discourse communities.

This genre-based conceptualisation aligns closely with established scholarship in genre theory. To move from the general role of genres to the specific implications for translation, it is useful to recall that Swales (1993) describes genres as communicative events shaped by shared purposes and discourse-community conventions, while Bhatia (1993) frames them as socio-rhetorical constructs reflecting professional practice. These perspectives reinforce the idea that scientific translation entails sensitivity to the epistemic foundations of scientific genres—the logic of inquiry, the structure of argumentation, and the conventions governing the formulation of claims and evidence. Earlier work in LSP studies similarly emphasises the importance of genre for translation practice (Dejica, 2011, 2020), identifying scientific genres as distinct subtypes of specialised communication with their own structural and rhetorical characteristics.

From this theoretical standpoint, the rhetorical profile of scientific genres becomes central to defining scientific translation. As articulated in Dejica (in press-a), scientific genres exhibit recurring discourse features: research-based textual organisation, often expressed through IMRaD patterns; structured argumentation linking methodology, evidence and interpretation; intertextual anchoring through citations and disciplinary alignment; hedging and epistemic modulation signalling degrees of certainty; terminological rigour ensuring conceptual

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precision; and a neutral, transparent style aligned with scientific objectivity. These observations are consistent with insights from genre scholarship—Trosborg (2000) highlights the structural regularities of specialised genres, while Bowker & Pearson (2002) emphasise the importance of terminology management and discourse conventions—confirming that scientific translation requires awareness of both linguistic and epistemic dimensions.

Having established the rhetorical characteristics of scientific genres, it becomes possible to situate scientific translation more systematically within LSP translation. The domain–genre–register typology proposed in Dejica (in press-a) underscores that genre, rather than domain, provides the most reliable basis for classifying scientific translation. Whereas domain labels may group together heterogeneous communicative practices, genre conventions more accurately reflect the expectations, constraints and epistemic functions of scientific discourse. In this sense, as Dejica (2020) demonstrates, scientific translation is best understood as the translation of texts whose primary communicative purposes are epistemic rather than operational or transactional.

The increasing technological mediation of scientific communication further reinforces the distinctiveness of scientific translation. As contemporary research ecosystems rely heavily on digital platforms, multimodal resources and AI-assisted writing and translation tools, translators must navigate workflows involving corpus consultation, terminology extraction, citation and reference management, and the post-editing of machine-generated drafts. Dejica (in press-a) notes that these developments heighten the translator's role as a mediator of scientific credibility and as a guardian of epistemic integrity, underscoring the need for genre-based competence, discourse analysis skills and technological fluency in scientific translation training and research. Moreover, the integration of technology intersects with broader issues of research ethics, authorship conventions and scholarly evaluation, expanding the scope of scientific translation beyond purely linguistic activities.

When these dimensions are considered together, a coherent picture emerges. The genre-anchored and epistemically oriented nature of scientific translation justifies the establishment of a dedicated conceptual and methodological foundation within LSP translation. By demonstrating that scientific translation is shaped by stable genre traditions, clear rhetorical patterns and scientifically motivated communicative purposes, Dejica (in press-a) provides a theoretical basis for delineating scientific translation as an autonomous field. Coupled with the documented scarcity of doctoral research addressing scientific translation in contexts such as Romania, these findings point to the necessity of systematic, genre-informed and technologically aware research on scientific discourse and its translation. As such, scientific translation can be regarded as a genre-based, epistemically motivated and discourse-governed translation type that warrants sustained scholarly attention and adapted pedagogical approaches.

3. Doctoral Research in Scientific Translation in the Romanian Landscape

The evolution of scientific translation as a research domain can be more clearly understood by examining doctoral research trends, particularly in contexts where translation studies have undergone significant institutional consolidation. A comprehensive investigation of 220 Romanian doctoral theses in translation studies, spanning nearly three decades, offers a valuable diagnostic perspective on the thematic orientations and methodological preferences that have shaped research activity in the field. The study reveals that scientific translation is markedly underrepresented in doctoral-level scholarship: only two theses explicitly address the translation of scientific genres (Dejica, Pungă, Badea & Vîlceanu, 2022). This quantitative imbalance stands in stark contrast to the central role that scientific communication plays in academic and professional environments, where multilingual dissemination has become a structural component of research practice.

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When viewed in context, this limited presence reflects broader tendencies in doctoral research. Much of the corpus is dominated by studies rooted in linguistic, contrastive or literary approaches, typically privileging text-level analysis, stylistics, discourse studies or cultural transfer. While such approaches contribute meaningfully to translation studies, they do not substantially engage with the genre-based, epistemically oriented challenges that define scientific translation. A considerable proportion of theses involving specialised translation concentrate on administrative, legal or general pragmatic genres rather than on scientific genres, which require sensitivity not only to terminology but also to rhetorical organisation, argumentative logic and the epistemic function of scientific discourse. The absence of sustained engagement with these dimensions indicates a structural misalignment between doctoral research production and the actual communicative needs of multilingual scientific communities.

This misalignment is further reflected in the methodological tendencies identified in the corpus. Corpus-based research dominates doctoral work, often complemented by qualitative or mixed methods, yet these approaches are rarely applied to scientific genres. The potential of corpus-driven rhetorical analysis, empirical studies of comprehension, reader-effort experiments, or investigations of technologically mediated translation workflows remains largely unexplored in relation to scientific texts. Given the increasing adoption of AI-assisted writing, MT-based drafting, and digital publication tools within scientific communication, the absence of methodological designs that integrate such technologies represents a missed opportunity for doctoral research to align more closely with contemporary scholarly practice.

Despite these limitations, the findings of the doctoral corpus also point toward several promising avenues for future inquiry. When interpreted in light of the genre-based principles articulated in Dejica (2020) and the epistemic framing introduced in Dejica, Pungă, Badea, & Vîlceanu (2022) and further consolidated in Dejica (in press-b), it becomes clear that scientific translation offers fertile ground for research focused on rhetorical and epistemic structures in scientific articles, abstracts and conference presentations; cross-linguistic variation in argumentation and hedging; empirical studies on readability and cognitive processing; multimodal and digital scientific communication; and the analysis of AI-mediated drafting and post-editing in academic settings. Equally relevant are topics connected to research integrity—such as citation practices, authorship conventions and ethical considerations in multilingual dissemination—which have become increasingly prominent in a globalised research landscape.

Taken together, these observations underscore a persistent discrepancy between the communicative centrality of scientific discourse and the limited attention it has received within doctoral-level translation studies. Yet they also highlight a significant opportunity: the conceptual and methodological foundations for a distinct research field in scientific translation already exist, articulated in Dejica (2020, in press-a) and supported by established genre theory (Swales 1993; Bhatia, 1993). What remains is the systematic exploration of these foundations through doctoral research capable of addressing the epistemic, rhetorical and technological complexities of scientific communication. In this sense, scientific translation emerges not only as an underexplored area but as a research domain with substantial potential to contribute to both translation studies and the broader interdisciplinary study of knowledge dissemination.

4. A Conceptual Framework for Research in Scientific Translation

Developing a coherent research agenda for scientific translation requires a conceptual framework capable of capturing the genre-based, epistemic and technologically mediated nature of scientific discourse. Building on general research priorities in Translation Studies (Williams & Chesterman, 2002; Vandepitte, 2008), on competence frameworks (PACTE, 2003; EMT, 2022), on foundational contributions from Swales (1993) and Bhatia (1993), as well as on the domain–genre–register typology and classification principles proposed in Dejica (2020, in

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press-a), such a framework provides the methodological orientation needed to advance systematic, empirically grounded and theoretically informed studies in the field. The framework comprises eight interrelated elements—types of studies, approaches, methods, theories, domain, genre, medium and technology—each of which is discussed, illustrated and contextualised here with specific reference to the requirements and characteristics of scientific translation. It thus consolidates the essential dimensions of scientific-translation research and positions scientific translation within the broader context of specialised communication.

At the core of this framework lie the types of research that can be undertaken in scientific translation. Critical studies focus on the analysis of translated scientific texts, paying particular attention to the accuracy of rhetorical organisation, argumentative structure and terminological coherence. Descriptive studies examine translation processes and strategies, shedding light on how translators manage the epistemic and rhetorical features that underlie scientific discourse. Product-based evaluations assess translation quality through criteria such as conceptual precision, consistency of terminology and alignment with journal conventions, while didactic and training-oriented studies address the question of how competence in scientific translation can be taught, measured and adapted to increasingly technology-mediated environments. These categories resonate with tendencies identified in doctoral research (Dejica, Pungă, Badea & Vîlceanu, 2022), yet they adapt them specifically to the requirements of scientific genres.

To support these research types, the framework incorporates several analytical approaches, each offering complementary insights into the functioning of scientific translation. Genre-based approaches, grounded in the work of Swales and Bhatia, illuminate how scientific texts reflect the communicative purposes and expectations of discourse communities. Epistemic and rhetorical approaches examine how scientific knowledge is constructed, validated and communicated, while cognitive-discursive approaches explore how translators process argumentation, conceptual density and methodological description. Sociocultural and institutional approaches, in turn, situate translation within the broader ecology of academic evaluation, peer review, authorship conventions and disciplinary norms. A linguistic approach to translation studies also remains essential, as it supports the analysis of cohesion, terminology, information structure or other micro-level features that underpin the clarity and precision of scientific discourse. As shown in a similar study (Dejica, in press-b), in the context of scientific translation these approaches contribute to a comprehensive understanding of how scientific texts operate and how translators can preserve their rhetorical integrity and epistemic transparency.

The framework also includes a broad repertoire of research methods suited to scientific translation. Corpus-based methods enable systematic comparisons across languages and disciplines, revealing patterns in hedging, claims, citation practices or terminological variation. Qualitative discourse analysis offers tools for examining argumentation, coherence and rhetorical strategies, while experimental and empirical methods—such as reader-effort or readability studies—capture how translated scientific texts are processed by diverse audiences. Technologically mediated process research adds a further dimension by analysing the workflows involved in AI-assisted writing, machine-translation post-editing, terminology extraction or reference management. While corpus-based designs dominate doctoral work, they are seldom applied to scientific genres; the framework therefore encourages broader methodological diversity, especially given the evolving technological infrastructure of scientific communication.

Complementing these methodological tools are the theoretical foundations developed within Translation Studies that anchor research in scientific translation. General translation theories (Bassnett, 2002; Baker & Jones, 2011) provide broad conceptual frames for understanding translation as a communicative and intercultural activity. Functionalist and Skopos-based approaches (Vermeer, 1978; Reiß & Vermeer, 1984; Nord, 1991) are particularly

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relevant for scientific translation, as they emphasise the primacy of communicative purpose and enable the alignment of translational decisions with the epistemic aims of scientific genres. Equivalence-derived models (Nida, 1964; Nida & Taber, 1969) support analyses of semantic, terminological and conceptual correspondence across languages, while Polysystem theory (Even-Zohar, 1978; Toury, 1995) situates scientific translation within the broader dynamics of disciplinary and institutional systems. Interpretive Theory (Seleskovitch, 1978; Lederer, 1981) and Relevance Theory (Gutt, 1991) contribute frameworks for examining inferencing, information density and sense construction in scientific texts, and Translational Action Theory (Holz-Mänttäri, 1984) highlights the coordinated roles and responsibilities involved in producing scientifically valid translations. Together, these TS theories form a coherent conceptual basis for analysing scientific translation as a specialised, epistemically driven communicative practice.

The framework further situates scientific translation across domains and disciplinary contexts, acknowledging that research spans fields as diverse as the natural sciences, engineering, medical sciences, social sciences and the humanities. As documented in Dejica (2020), each domain contributes its own terminological systems, methodological traditions and discourse preferences, making domain literacy an essential component of both research and training. Closely related to domain considerations is the role of scientific genres, which constitute the primary unit of analysis. Research articles, reports, abstracts, theses, dissertations, conference papers and extended scientific works each display distinctive rhetorical and epistemic features, as described in Dejica (in press-a), and operate within the conventions of specific discourse communities.

Scientific translation also manifests across multiple modes of realisation. Beyond traditional written genres such as articles, reports and theses, contemporary science relies increasingly on multimodal genres—slides, posters, graphical abstracts and research videos—and on digital genres mediated through platforms, repositories and preprint infrastructures. These developments call for research into multimodal cohesion, the interplay between visual and verbal meaning, and the cross-media transfer of specialised knowledge.

Finally, the growing presence of technology and AI is a defining element of the framework. Scientific translation now depends on corpus tools, terminology extraction, AI-assisted writing systems, MT engines, post-editing workflows, quality-assurance systems and citation-management tools. As Dejica (in press-b) emphasises, translators must combine linguistic expertise with technological fluency, making the study of tool-mediated processes essential for understanding how scientific discourse is produced, transformed and validated across languages.

Taken together, these elements form a comprehensive framework for the systematic study of scientific translation. The framework supports the formulation of research agendas, the design of doctoral projects and the development of pedagogical content aligned with the communicative, epistemic and technological needs of scientific discourse. It thus provides the conceptual scaffolding necessary for consolidating scientific translation as a rigorous and autonomous field within translation studies.

5. Strategic Scenarios for Scientific Translation Research

The operationalisation of scientific translation research requires a set of coherent, conceptually grounded, and methodologically feasible research scenarios that reflect the epistemic, rhetorical and technological realities of contemporary scientific communication. Similar to the manner in which other types of LSP translation benefit from explicit scenario modelling (Dejica, in press-b), scientific translation research can be strengthened by adopting study designs that integrate the eight categories defined in the conceptual framework—type of

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study, approach, method, theory, domain, genre, medium and technology—into structured, replicable research templates. These scenarios address gaps identified in doctoral research (Dejica, Pungă, Badea & Vîlceanu, 2022), respond to the principles articulated in Dejica (in press-a), and align scientific translation studies with the communicative, technological and institutional conditions of present-day research ecosystems Dejica (in press-b). A well-formed scientific translation research scenario operationalises the genre-based delimitation of scientific texts, treats epistemic integrity as an explicit research variable, and integrates technology—including AI—as an integral part of the study design rather than as an ancillary element.

The following ten theoretical scenarios exemplify this structure. Collectively, they are designed to help doctoral and early-career researchers formulate projects that contribute cumulative, practice-oriented and epistemically robust evidence to the field of scientific translation.

Scenario 1 — Human-AI collaboration in the translation of scientific texts and research discourse.

Conceived as a mixed product- and process-based, fact-finding study, this scenario adopts a functional/communicative and technology-mediated approach with an organisational lens to trace how human translators and AI-generated drafts co-construct scientific discourse. The methods triangulate a parallel corpus of author drafts vs. post-edited versions, instrumented post-editing (time, keystrokes, revision density) and expert audits of epistemic integrity. The theoretical anchoring integrates Skopos/Functionalism (to preserve the epistemic purpose of the target text), Relevance Theory (to calibrate inferential load and reader processing after post-editing), and Translational Action Theory (to model role-coordination across author–translator–editor–tool ecologies). Domains can be multidisciplinary STEM with intensive AI adoption; genres include abstracts, full IMRaD articles and conference papers; media involve manuscript PDFs and submission platforms with version tracking; and technology comprises CAT + MT + LLM drafting, termbases, automated QA and provenance/version-control pipelines. This scenario has two main advantages: it supplies theory-anchored criteria for responsible human–AI post-editing and, at the same time, it specifies workflow-level parameters that TS can use to safeguard epistemic integrity across tool-mediated pipelines.

Scenario 2 — Controlled scientific language and its effects on the translation and comprehension of scientific texts.

As a product-based A/B experiment with a functional and cognitive-pragmatic approach, this scenario tests how controlled language in translated abstracts or Results sections affects comprehension and reader effort. The methods compare controlled-language vs. non-controlled conditions using comprehension tests, reading-time metrics and eye-tracking; the theory combines Skopos (purpose-fit clarity) with Relevance (reduced inferential burden) and Equivalence (terminological and definitional correspondence). Biomedical sciences or engineering offer suitable domains; genres focus on abstracts, Results and plain-language summaries; media include HTML journal pages and PDFs; technology relies on termbase-enforced CAT, controlled-language QA profiles, readability calculators and eye-tracking suites. The added value of this scenario lies in providing experimental, reader-effort evidence that operationalises Skopos and Relevance into measurable, reproducible gains in the clarity and interpretability of translated scientific texts.

Scenario 3 — Translating scientific argumentation and claims.

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Designed as a product-based, fact-finding project with a genre-rhetorical and epistemic-discourse approach, this scenario examines how argumentative structures and claim strength travel across languages. Methods include move analysis on Introductions and Discussions, rhetorical annotation, and expert scientist panels to judge claim gradation and evidential alignment. Skopos theory grounds function-preserving choices, the Interpretive Theory (sense reconstruction) supports transfer of complex reasoning chains, and the Relevance theory explains how hedges/boosters guide inference and coherence. The domain may be materials science (contrasted with a social-science subcorpus); genre centres on Introductions, Discussions and research synopses; the medium is PDF/XML article bodies; technology includes corpus annotation tools, concordancers and citation-link visualisers. By linking move-structure fidelity to claim strength under Skopos/Interpretive/Relevance lenses, this research scenario establishes replicable metrics for preserving scientific reasoning in translation.

Scenario 4 — Cross-linguistic translation of scientific hedging and modality in Discussions and Conclusions.

In this scenario, a descriptive, product-based study with an experimental perception sub-study and an epistemic-linguistic, genre-based approach investigates how hedging shifts influence perceived credibility. Methods combine annotated comparable corpora of Discussions/Conclusions (frequency/dispersion of hedges) with reader-judgement experiments on certainty. Relevance accounts for stance interpretation, Equivalence tests pragmatic matching of modal forms, and DTS/Polysystem maps systematic target-language tendencies to norms and disciplinary systems. The domain may be biomedical engineering; genre targets Discussions, Conclusions and peer-review replies; media are journal PDFs and reviewer-response documents; technology uses NLP-assisted hedge detection, statistical toolkits and survey platforms. The advantage of this scenario is a norm-aware, perception-tested map of hedging that turns stance calibration into actionable TS guidance across languages and disciplines.

Scenario 5 — Translating scientific definitions, terminology and concept-systems across specialised domains.

This scenario uses a fact-finding/product-based inquiry with a terminological/ontological, genre-aware approach to demonstrate how translation affects conceptual precision. Methods include domain-specific term extraction, definitional alignment, concept-map building and Delphi-style expert validation. Equivalence underpins semantic/conceptual alignment; Skopos justifies definitional choices that protect the target text's epistemic function; Translational Action clarifies multi-actor terminology governance. Suitable domains include chemistry or molecular biology; genres cover Methods, glossaries, extended reports and reviews; media are XML/HTML publisher outputs with supplementary datasets; technology comprises term extractors, ontology tools, collaborative termbanks and versioned glossaries. This scenario generates validated procedures for concept alignment (Equivalence) and multi-actor governance (Translational Action), strengthening terminology policy for scientific translation practice and training.

Scenario 6 — Multimodal scientific translation: graphs, figures and visual reasoning.

A mixed product-/empirical study with a multimodal, functional and cognitive-pragmatic approach assesses how visual–verbal coherence shapes understanding.

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Methods combine visual-verbal alignment annotation with eye-tracking over figure captions/legends and task-based comprehension measures. Skopos motivates audience-relevant reconstrual of visuals; Relevance models cross-modal inference and effort; Translational Action captures collaboration among authors, translators and designers. Domains may be medicine or computer science (e.g., ML visualisations); genres include graphical abstracts, posters, slide decks and figure-rich sections; media range across PPT/PDF/MP4 and interactive publisher figures; technology involves captioning/subtitling, layout QA and accessibility checkers. The originality of this scenario is the establishment of cross-modal criteria that TS can use to ensure function-fit captions and cognitively economical figure–text integration in science communication.

Scenario 7 — Reader-effort and accessibility in translated scientific abstracts.

An experimental product-based design with a cognitive/reader-response, functional approach quantifies how different audiences process translated abstracts. Methods use reading-time, cloze and recall tests with subjective difficulty ratings, comparing experts, students and cross-disciplinary readers. Relevance predicts processing effort/optimal relevance; Equivalence helps evaluate lexico-syntactic choices that bear on interpretability; Skopos ensures the target abstract's purpose (accurate, faithful framing) remains central. Domains span multidisciplinary journals with structured abstracts; genres include abstracts and lay summaries; media are HTML abstract pages and PDF front matter; technology uses eye-tracking, reading-time loggers and readability metrics. This scenario offers cognitive benchmarks for abstract quality (Relevance + Skopos), enabling TS to predict and assess comprehension across expert and non-expert readerships.

Scenario 8 — Translating citations and intertextual references in multilingual scientific communication.

A fact-finding product-based audit with an intertextual/ethical and organisational approach examines the fidelity of citations across languages. Methods include citation matching/alignment, reference-list verification and interviews with editors/authors to map decision pathways. Translational Action clarifies responsibility flows and approval checkpoints; Skopos frames faithful scholarly attribution; DTS/Polysystem explains recurrent patterns (e.g., normalisation of citation styles) as systemic. Domains may contrast humanities/social sciences with STEM; genres encompass research articles and theses; media are PDFs and manuscript-management systems; technology includes DOI resolvers, similarity detection and citation-graph tools. The added value of this scenario is an auditable protocol for multilingual citation fidelity that embeds ethics-by-design into TS editorial and translation workflows.

Scenario 9 — Genre variation in the translation of scientific Introductions and Discussions across disciplines.

A descriptive, theory-building study with a genre-rhetorical, cross-cultural approach compares rhetorical patterning across languages and shows how translation negotiates differences. Methods employ multilingual move analysis with effect-size comparisons of move frequency/sequence. DTS/Polysystem provides a lens for norms and systems; Skopos anchors decisions that preserve the scientific article's function for the target discourse community. Domains contrast natural sciences and social sciences; genres are Introductions and Discussions; media comprise PDFs and XML repositories; technology includes NLP-assisted

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move detection, concordancers and visual analytics. The originality of this scenario lies in delivering a comparative, theory-building baseline on genre norms and function-preserving strategies, informing TS pedagogy, evaluation and cross-cultural genre mediation.

Scenario 10 — Mapping the ecology of scientific translation as a profession.

A process-based organisational ethnography with a sociological/ethnographic, competence-oriented approach maps how scientific translations are actually produced and validated. Methods combine multi-site case studies, semi-structured interviews and analysis of SOPs/style guides/QA checklists. Translational Action models task/role distribution, PACTE and EMT define competence profiles for technology, research and ethics, and DTS/Polysystem explains how institutional and disciplinary systems shape translator roles and quality governance. Domains include research-intensive universities, scholarly publishers and funder-mandated dissemination; genres range across research articles, grant proposals and peer-review communications; media centre on OJS/ScholarOne templates; technology covers version control, CAT/MT pipelines, LLM-assisted drafting and terminology-QA dashboards. The advantage of this scenario is a competence-profiled, role-explicit model of scientific translation that TS can use directly for curriculum design, quality assurance and institutional policy.

Together, these ten scenarios provide a practice-oriented, genre-anchored and epistemically informed roadmap for advancing scientific translation research. They respond directly to the gaps identified in the doctoral landscape—particularly the scarcity of genre-based, empirical and technologically mediated studies—and they align scientific translation research with the conceptual and methodological principles articulated in Dejica (2020) and Dejica (in press-b). They promote cumulative knowledge-building by shifting analytical focus from isolated text pairs to structured genre tasks, by embedding epistemic integrity and rhetorical accuracy into study design, and by integrating technology, especially AI, as an explicit research variable. In doing so, they establish a coherent foundation for doctoral inquiry and for the consolidation of scientific translation as an autonomous, scientifically tractable field within translation studies.

6. Conclusion

This article has advanced scientific translation as a distinct, genre-anchored and epistemically oriented field within LSP translation by consolidating its conceptual foundations and by articulating a research agenda that is both theoretically principled and methodologically feasible. It has argued that scientific translation should be defined primarily through its genre ecology and epistemic purposes rather than by domain labels, and it has related this conceptual stance to the current state of doctoral research, where scientific translation remains markedly underrepresented despite the centrality of scientific communication to knowledge production and dissemination. In doing so, the article reframed a recognised gap in research into a structured opportunity for sustained inquiry.

Building on this foundation, the study proposed a comprehensive framework that captures the essential dimensions of scientific-translation research—type of study, approach, method, theory, domain, genre, medium, and technology—and demonstrated how each element can be mobilised to design rigorous and replicable projects. The framework formalises a common language for research design while preserving flexibility across disciplinary contexts and communicative situations, thus enabling cumulative knowledge building rather than isolated case analyses.

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The article then operationalised the framework through ten strategic scenarios, each explicitly specifying the eight elements and each anchored in Translation-Studies theories (notably Skopos/Functionalism, Relevance, Descriptive Translation Studies/Polysystem, Interpretive Theory, Translational Action, Equivalence) and competence models such as PACTE and EMT. By mapping theoretical lenses to concrete design choices—product vs. process emphasis, corpus annotation vs. experimental testing, genre selection, medium constraints, and technology stacks (CAT, MT, LLMs, QA)—the scenarios translate abstract constructs into testable, doctoral-level blueprints. Their scope covers the core pressures of contemporary scientific communication: argumentation and claim strength, hedging and modality, definition and terminology governance, multimodality, reader-effort and accessibility, citation integrity, cross-linguistic genre variation, and the professional ecology of scientific translation.

A further contribution lies in the explicit "added-value" statements that conclude each scenario. These statements crystallise the potential advantages, the originality and the relevance of the proposed research scenarios for Translation Studies: they indicate how theory might lead to measurable outcomes (e.g., post-editing criteria for human–AI workflows), how experimental evidence could calibrate functional clarity and cognitive processing, and how auditable protocols might strengthen ethics-by-design in multilingual scholarly communication. As such, they are likely to provide evaluative yardsticks for doctoral committees and clear benefits for curriculum design, quality assurance and institutional policy.

Methodologically, the agenda encourages design diversity beyond corpus description—combining rhetorical annotation, reader-effort experiments, instrumented post-editing, multimodal analysis and workflow ethnography—while treating technology as an explicit research variable rather than a neutral tool. Transparent reporting of tool configurations (CAT/MT/LLM parameters, QA profiles, version control), data provenance and annotation protocols is recommended to support replicability and to align scientific-translation research with good scholarly practice in adjacent fields.

Although the analytical framework and scenarios presented in this study are informed by the Romanian research landscape—particularly through the diagnostic of doctoral theses and the observation of locally prevalent workflows—this contextual anchoring inevitably imposes certain limitations on the generalisability of the findings. At the same time, the framework and the research scenario templates have been deliberately formulated so that they may be adapted and replicated in other institutional, disciplinary and linguistic contexts or for other types of LSP translation. Such replications would make it possible to test the robustness of the proposed research designs and to contribute to the consolidation of scientific translation as a comparable, scalable and cumulatively validated domain of inquiry within Translation Studies.

Looking ahead, the agenda invites multi-site collaborations and cross-linguistic validation of scenario outcomes, along with open, standards-compliant sharing of de-identified corpora, annotation schemes and evaluation rubrics. These steps will accelerate comparative research, reduce duplication and help institutionalise scientific translation as a scientifically tractable and socially relevant area within Translation Studies—one whose findings can feed directly into training, editorial workflows and research-integrity policies. In sum, by aligning conceptual clarity with scenario-level specificity, and by embedding TS theory into every design choice, the article provides the scaffolding and the tools for a sustained, evidence-driven research culture in scientific translation.

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