

Impact of Web of Science and Scopus Policies on Multiple Document-Type Classification

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ON SCIENTOMETRICS & INFORMETRICS**

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23–27 June 2025

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PROCEEDINGS

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Shushanik Sargsyan, Wolfgang Glänzel, Giovanni Abramo

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Preface

It is our great pleasure to present the *Proceedings of the 20th International Conference on Scientometrics & Informetrics (ISSI2025)* of the International Society for Scientometrics and Informetrics, held from June 23 to 27, 2025, in Yerevan, Armenia. This edition of the ISSI conference marks four decades of global exchange and collaboration in the field of scientometrics and informetrics — a field that continues to grow in relevance as science itself evolves in complexity, scope, and global impact.

Hosted for the first time in the South Caucasus, ISSI2025 brought together over 230 participants from more than 38 countries, making it one of the most geographically and thematically inclusive gatherings in the history of the ISSI community. The conference's theme — “Shaping the Future: New Horizons in the Science of Science” — inspired reflection on our field's legacy while encouraging the exploration of bold new directions for scientometric research.

The conference opened with warm welcomes from local and international leaders, including representatives of Armenia's academic and governmental institutions and the President of ISSI.

Two keynote addresses, delivered by **Mike Thelwall** and **Gunnar Sivertsen**, focused on some of the field's most burning questions — including the use of Large Language Models in evaluative contexts and the core values guiding our work in research assessment and policy-relevant application.

During five days, ISSI2025 featured:

- **More than 30 parallel sessions**, showcasing cutting-edge work in areas such as advanced informetric models, science policy and research evaluation, artificial intelligence and scientometrics, open science, micro- and macro-level analysis, technology and innovation studies, and gender, collaboration, and mobility in science.
- **The Doctoral Forum**, providing early-stage researchers an opportunity to present and discuss their work with peers and senior experts in the field.
- **Workshops and Tutorials**, including:
 - The Joint Workshop of the 5th AI + Informetrics (AII) and the 6th Extraction and Evaluation of Knowledge Entities from Scientific Documents (EEKE) — AII-EEKE 2025
 - The tutorial "Exploring the OpenAIRE Graph on Google Big Query", offering hands-on insights into open scholarly data
- **Two special tracks:**
 - *FRAME (Framework for the Responsible Use of Assessments and Metrics in Evaluation)*, dedicated to developing fair, inclusive, and context-sensitive approaches to research evaluation

- *Open Research Information (ORI)*, focused on infrastructures and practices in sharing scientific metadata
- A **poster session**, featuring a wide range of emerging work and interdisciplinary projects
- The presentation of the prestigious **Derek de Solla Price Award** by the international journal *Scientometrics*
- **Student Travel Awards**, supporting young researchers from around the world
- An award ceremony and closing events, celebrating contributions from across the global scientometric community, including:
 - The **Eugene Garfield Doctoral Dissertation Scholarship**, awarded to an exceptional doctoral student for outstanding research in the field
 - **Best Paper Award**, recognizing the most impactful and innovative research presented at the conference
- The **ISSI General Assembly**, where future plans and institutional developments were discussed

This volume publishes the peer-reviewed papers (*full papers, research-in-progress, and poster papers*) presented during the conference. It reflects the thematic richness and methodological diversity of our community, and highlights the increasing interrelation between scientometric methods and broader societal challenges — including sustainability, policy innovation, and the responsible use of AI.

We would like to express our deepest thanks to the International Society for Scientometrics and Informetrics (ISSI) for their trust and support, as well as to our academic partners, sponsors, and institutional collaborators in Armenia. Special appreciation goes to the reviewers, session chairs, keynote speakers, and the tireless members of the organizing and scientific committees.

Most importantly, we thank all authors and participants for their contributions to this vibrant intellectual exchange. May these proceedings serve as a valuable resource for ongoing research, and as inspiration for the continued development of scientometrics as a field committed to rigor, openness, and global inclusivity.

Shushanik Sargsyan, Wolfgang Glänzel, Giovanni Abramo

Index of proceedings papers

Framework for the Responsible use of Assessments and Metrics in Evaluation (Frame)

Advancing Responsible Bibliometric Practices in Research Assessment An Introduction to the ISSI 2025 Special Track “A framework for the responsible use of bibliometrics in research evaluation” (FRAME)	3
<i>Cinzia Daraio, Wolfgang Glänzel, Juan Gorraiz</i>	
A Responsible Framework for an Appropriate Bibliometric-Based Research Assessment.....	6
<i>Cinzia Daraio, Wolfgang Glänzel, Juan Gorraiz</i>	
The New Alliance. Bringing Together Bibliometric and Library Science for a Responsible Assessment of Research in SSH.....	16
<i>Andrea Bonaccorsi</i>	
Trueblood et al.’s Ideas on Research Evaluation and Implications for Reforming Research Assessment.....	31
<i>Ronald Rousseau</i>	
Responsible Research Assessment of Teams: Reflections and Perspectives After Two Evaluation Cycles at the University of Antwerp, Belgium.....	37
<i>Tim C.E. Engel, Birgit Houben, Pieter Spooren</i>	
Toward Responsible Scientometrics: Normative Data Practices for Research Evaluation.....	47
<i>Ying Huang M, Weishu Liu, Huizhen Fu, Jing Ma, Guijie Zhang, Yi Bu, Chao Min, Zhixiang Wu</i>	
Responsible Metrics for The Assessment of Research Organizations.....	66
<i>Gunnar Sivertse, Lin Zhang, Alex Rushforth</i>	
Responsible Uses of Large Language Models for Research Evaluation.....	71
<i>Mike Thelwall</i>	

Mapping National Research That Targets Sustainable Development Goals: The Responsible Visualization of Openalex Data for Societal Impact Measurements of Research.....	81
<i>Robin Haunschild, Lutz Bornmann</i>	
Does Evaluating Research Still Need Virtues in the Age of ChatGPT?.....	89
<i>Alessio Vaccari, Cinzia Daraio</i>	
Towards a Responsible Research Assessment Transition: A Novel Framework for Researcher Profiles.....	101
<i>Zenia Xenou, Giulia Malaguarnera, Lottie Provost, Natalia Manola</i>	
Can scientific papers be unretracted?.....	110
<i>Marek Kosmulski</i>	
Ethical and responsible model for the National Science, Technology and Innovation System in Colombia.....	112
<i>María Alejandra Tejada-Gómez, Mabel Ayure-Urrego</i>	

Open Research Information (ORI)

Usage, Advancements, and Limitations of Open Research Information Data Sources: An Introduction to the ISSI 2025 Special Track “Open Research Information” (ORI).....	117
<i>Robin Haunschild, Lin Zhang, Erjia Yan</i>	
Annotation and Identification of Scientific Data Sharing Information from Data Availability Section.....	119
<i>Shuo Xu, Jiahao Li, Xin An, Shengnan Wang, Jianhua Liu, Yuefu Zhang</i>	
How well does OpenAlex cover the Flemish Social Sciences and Humanities?..	128
<i>Eline Vandewalle, Cristina Arhiliuc</i>	
Multi-Disciplinary, Large Scale Mentorship Dataset and Demographics.....	142
<i>Chiaki Miura, Yoshiyasu Watanabe, Tsubasa Sakamoto, Hiroshi Hashizume</i>	
What Are We Missing? A Systematic Approach to Overlap Analyses of Local and Global Repositories.....	149
<i>Simon Willemin, Gaël Bernard, Julian Dederke, Mahmoud Hemila, Michelle Koch</i>	

Full papers

"From Essential to Obsolete? The Evolution of Personal Communications in Academic Research and Citation Practices"	159
<i>Juan Gorraiz</i>	
A Comparative Study on Text Multi-Features Mining for Patent Text Clustering: The Case of Graphene Sensing Technology	174
<i>Xian Zhang, Jiahui Li, Shuying Li, Haiyun Xu</i>	
A Novel Bibliometric Algorithm Unveils the Prevalence and Significance of Gender Match in Research Mentorship Networks	198
<i>David Campbell, Guillaume Roberge, Elisabeth Browning</i>	
A Research Entities Disambiguation Methodology Tested on Brazilian Researchers Database	214
<i>Alysson Fernandes Mazoni, Estevão Fernandes Macedo, Luís Fabiano Farias Borges, Esteban Fernandez Tuesta</i>	
Almost Always Unequal: Co-Authors' Contributions to Scientific Publications	223
<i>Paul Donner, Philippe Vincent-Lamarre</i>	
An Empirical Study on the Distributional Characteristics of Policy Citation Behaviors in Climate Action Policies	237
<i>Zheng Xinman, Liu Xiwen</i>	
An Unsustainable Equation: Average Article Processing Charges Exceed Swedish Average PhD Salaries	253
<i>A. I. M. Jakaria Rahman, Marco Schirone, Patrik Bergvall</i>	
Analysis of Relationships Between Paper Citations and Their Category Influencing Factors: A Bayesian Network with Latent Variables Approach.....	269
<i>Mingyue Sun, Mingliang Yue, Wen Peng, Tingcan Ma</i>	
Are Citation Context Information Stronger Related to Peer Ratings Than Citation Counts? A Descriptive Analysis	294
<i>Paul Donner, Stephan Stahlschmidt, Robin Haunschild, Lutz Bornmann</i>	

Assessment of a Research Funding Organization for International Mobility by Bibliometric Means. Implementation, Results and Challenges of Responsible Research Evaluation	302
<i>Torger Möller, Philippe Dittmann</i>	
Balancing Accuracy and Explainability: An Ensemble-KAN Model for Patent Grant Prediction	319
<i>Jing Shi, Xinyi Peng, Xizhen Qiao, Ye Chen, Xiao Liu</i>	
Boost Formalism- A New Framework to Assess the Impact of Collaborations at Institutional Level	342
<i>Prashasti Singh, Vivek Kumar Singh, Abhirup Nandy, Hiran H Lathabai</i>	
Bridging Classification Systems: The Potentialities of Artificial Intelligence in Developing Concordance Tables for Science, Technology, and Policy	362
<i>Guendalina Capece, Cinzia Daraio, Flavia Di Costa</i>	
Characterizing Global Gender Gaps in STEM Using Facebook Data.....	386
<i>Carolina Coimbra Vieira, Marisa Vasconcelos</i>	
Citation Context Analysis: Evaluating Human vs. AI Annotations in Gameplay Bricks Research	401
<i>Marc Bertin, Julian Alvarez, Thierry Lafouge</i>	
Co-funding networks as a new tool in research evaluation: a linked open data-based study of the Seventh Framework Programme projects	427
<i>Niliek Silva-Alés, Antonio Perianes-Rodríguez</i>	
Scientific Landscape in the South Caucasus: A Comparative Analysis of Armenia, Azerbaijan, and Georgia (2012–2024)	447
<i>Edita Gzoyan, Aram Mirzoyan, Gevorg Kesoyan, Mariam Yeghikyan, Simon Hunanyan, Shushanik Sargsyan</i>	
Crossing Disciplinary Borders: How Italian SSH Journal Rankings Address Multidisciplinarity	460
<i>Tindaro Cicero, Marco Malgarini, Marilena Maniaci</i>	
Digital Twins in Healthcare: State of the Art, Bibliometric Analysis and Future Perspectives	473
<i>Cinzia Daraio, Simone Di Leo, Jacopo Orsini</i>	

Document Coverage and Citation-Based Indicators: A Case Study on The Scientific Production of The Federal University of Rio De Janeiro Recovered by Web of Science, Scopus, Dimensions and Lens.....	499
<i>Gabriel Alves Vieira, Jacqueline Leta</i>	
Enhancing Research Idea Generation through Combinatorial Innovation and Multi-Agent Iterative Search Strategies	525
<i>Shuai Chen, Chengzhi Zhang</i>	
Evaluating the Obsolescence Patterns in Early and Non-Early Publications: The Role of Open Access and Document Type	553
<i>Huei-Ru Dong, Mu-Hsuan Huang</i>	
Evaluating the Scholarly Contributions of a Journal by Measuring the Discrepancy in Information Entropy Values Between Factual and Counterfactual Knowledge Systems in the Absence of the Journal	563
<i>Zheng Ma, Liao Yu, Zhenglu Yu, Hongmei Guo, Ming Cheng</i>	
Examining the Cognitive Gap Between Authors and Peer Reviewers on Academic Paper Novelty	585
<i>Chenggang Yang, Chengzhi Zhang</i>	
Examining the Patenting Activities of Universities in the Middle East and North Africa	615
<i>Jamal El-Ouahi</i>	
Exploring Multi-Energy Convergence Through Knowledge Graphs and Patent Bibliometrics	631
<i>Shuying Li, Xian Zhang, Wudan Ma, Xiaoyu Wang, Chunjiang Liu, Haiyun Xu, Edwin Garces</i>	
Exploring Nobel Laureates' Question Selection Characteristics from a Topical Perspective	659
<i>Zou Xinran, Dong Yu, Wu Jiaxin</i>	
Exploring Novelty Differences between Industry and Academia: A Knowledge Entity-centric Perspective	677
<i>Hongye Zhao, Yi Zhao, Chengzhi Zhang</i>	
Exploring Scientist's Research Trajectories within a Field with Main Path Analysis	703
<i>Chung-Huei Kuan, Szu-Chia Lo</i>	

Exploring the Application of Open Peer Review in Academic Evaluation: An Analysis of H1 Connect Recommended Papers	718
<i>Liu Xiaojuan, Xiang Nannan, Yu Yao</i>	
From Search to Recommendation: Using an LLM to Assess the Usefulness of Academic Articles	745
<i>Frans van der Sluis, Alesia Zuccala, Haakon Lund</i>	
Gender Differences in Research Methods: Insights from Chinese Humanities and Social Sciences PhD Dissertations	758
<i>Xinyu Deng, Hui Xu, Zihui Li, Huiwen Bai, Lanfeng Ni, Chengzhi Zhang</i>	
Gender Disparities in Academic Research: A Comparative Study of Armenia and Italy	784
<i>Shushanik Sargsyan, Edit Gzoyan, Giovanni Abramo, Ciriaco Andrea D'Angelo</i>	
Gendered Collaboration Networks and Their Consequences on Conflicts between Academics	804
<i>László Lőrincz, Brigitta Németh, Tamás Felföldi</i>	
Green or Gold: Exploring How Open Access Models Shape Global Research Integrity	823
<i>Denis Kosyakov</i>	
Guidance List for Reporting Bibliometric Analyses (GLOBAL): A Two-Round Modified Delphi Study.....	837
<i>Jeremy Y. Ng, Henry Liu, Mehvish Masood, Niveen Syed, Ludo Waltman, Stefanie Haustein, Michel Sabé, Marco Solmi, Dimity Stephen, Alexander Schniedermann, Simon Willemin, Marianne Gauffriau, Jens Peter Andersen, Lutz Bornmann, Rodrigo Costas, Wolfgang Glänzel, Sybille Hinze, Nicolas Robinson- Garcia, Gunnar Sivertsen, Stephan Stahlschmidt, Thed van Leeuwen, Erija Yan, Cameron Neylon, Verena Weimer, Alesia Zuccala, David Moher</i>	
Higher Standards and Unnoticed Preference - the Impact of Editor-in-Chief on Collaborators	862
<i>Hao Yueru, Yue Mingliang, Ma Tingcan</i>	
How Can Citation Context Information Enrich Reference Publication Year Spectroscopy? A Case Study in Quantum Computing	876
<i>Thomas Scheidsteger, Robin Haunschild, Lutz Bornmann</i>	
How China and the United States Fund Artificial Intelligence? Multi- dimensional Characteristics Analysis from the Lifecycle Perspective.....	890
<i>Hui Zhang, Zhe Cao, Ying Huang, Lin Zhang</i>	

How Much are LLMs Changing the Language of Academic Papers?	914
<i>Kayvan Kousha, Mike Thelwall</i>	
How Scientific Research Impacts Policy Cycle	928
<i>Ashraf Maleki, Marianna Lehtisaari, Kim Holmberg</i>	
Identifying Vibrant Actors in Technology Development Through Their R&D Activity and Persistence	951
<i>You-Fu Lee, Dar-Zen Chen, Chun-Chieh Wang</i>	
Impact of Web of Science and Scopus Policies on Multiple Document-Type Classification	968
<i>Domenico A. Maisano, Lucrezia Ferrara, Fiorenzo Franceschini</i>	
Influence of Regulation on Research and Technology Maturation: A Bibliometric Investigation of Research in Aftertreatment Technology.....	985
<i>Sujit Bhattacharya, Sandhiya Laksmanan, Lata Kashyap</i>	
Insiders and Outsiders in International Scientific Collaboration: Distinguishing between Investigating and Investigated Countries	1012
<i>Zhe Cao, Lin Zhang, Gunnar Sivertsen, Zhihan Wan</i>	
Insights from Publication Timing: The Impact of Knowledge Features on the Disruptive Scores of Papers	1036
<i>Shan Huang, Jin Mao, Gang Li</i>	
Interdisciplinarity and Artificial Intelligence: A Two-Dimensional Analysis of Diversity and Cohesion	1060
<i>Sisi Li, Yuxian Liu, Ronald Rousseau, Hongrui Yang, Sanfa Cai, Xiaoyan Zhang</i>	
Interdisciplinarity, Collaboration and Industry Links in Australian Discovery and Linkage Projects (2023-25)	1089
<i>Hamid R. Jamali</i>	
Investigating Information Propagation in Biomedical Literature through Citations: A Case Study	1107
<i>M. Janina Sarol, Halil Kilicoglu</i>	
Is There Life on Mars? Studying the Context of Uncertainty in Astrobiology..	1124
<i>Iana Atanassova, Panggih Kusuma Ningrum, Nicolas Gutehrlé, Francis Lareau, Christophe Malaterre</i>	

Kazakhstani Scientific Collaboration with Post-Soviet Countries: Dynamics and Impact	1139
<i>Gulnaz Alibekova, Asselya Makanova</i>	
Knowledge Combination and Research Impact: A Comparison of Sources and Keywords Co-Citation	1158
<i>Hsiao Tsung-Ming, Tang Muh-Chyun</i>	
Leveraging Large Language Models for Post-Publication Peer Review: Potential and Limitations	1176
<i>Mengjia Wu, Yi Zhang, Robin Haunschild, Lutz Bornmann</i>	
Linking Data Citation to Repository Visibility: An Empirical Study.....	1196
<i>Fakhri Momeni, Janete Saldanha Bach, Brigitte Mathiak, Peter Mutschke</i>	
Linking Research Publications to SDGs: Exploring the SDG Mapping in Web of Science, Scopus and OpenAlex	1210
<i>Prashasti Singh, Vivek Kumar Singh, Anurag Kanaujia, Abhirup Nandy</i>	
Measuring the Continuous Research Impact of a Researcher: The K_z Index....	1227
<i>Kiran Sharma, Ziya Uddin</i>	
Model Construction and Empirical Research of China's Science Structure and Science Development	1246
<i>Qianfei Tian, Yunwei Chen, Zhiqiang Zhang</i>	
Network Position Matters: Collaborative Strategies, Talent Mobility, and Exploratory Innovation in Teams	1267
<i>Xiaoling Cheng, Jiajie Wang, Lele Kang</i>	
Author Index.....	1295

Impact of Web of Science and Scopus Policies on Multiple Document-Type Classification

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Abstract

Document-type (DT) classification – i.e., the assignment of conventional labels such as *article*, *review*, *proceedings paper*, etc., to scientific documents – is crucial for information retrieval in bibliometric databases, but its incomplete objectivity can lead to errors with implications on indicators and research evaluations. This study focuses on a portion of the documents (with a relatively small incidence ~4%) with dual-DT assignment in Web of Science (WoS) – a feature that is absent in Scopus, which applies only single-DT assignments – to assess their characteristics and classification accuracy.

A manual analysis of more than a thousand documents revealed three main scenarios of dual-DT assignment in WoS: (i) the combination of one DT describing the *content* and another describing the *container* (e.g., *book chapters*, *proceedings papers*), (ii) the handling of specialized DTs (e.g., *data paper*, *retracted paper*), and (iii) the combination of a DT related to journal publication with a temporary DT for the *early-access* designation.

Documents with dual-DT assignment in WoS exhibit higher error rates, confirming the greater difficulty of classification for both databases, even for Scopus, regardless of its single-DT policy. WoS's dual-DT classification policy offers more detail and potentially greater accuracy but also shows some inconsistencies. Conversely, Scopus's single-DT policy reduces the level of detail and increases the risk of misclassification, particularly for papers from *conference proceedings* or journal *special issues*.

This study highlights the need for clearer DT definitions and recommends that bibliometric databases consider adopting more flexible multiple-DT classification policies to enhance both detail and accuracy in document classification. A limitation of this research is the relatively small *corpus* of documents analysed, which will be expanded in future studies.

Introduction

Document types (DTs) – such as research *articles*, *reviews*, *proceedings papers*, and *book chapters* – are conventional labels applied to scientific documents to describe their nature and main characteristics, facilitating information retrieval (Donner, 2017; Yeung, 2021). Depending on the publication context, DTs can be assigned by various stakeholders, including authors, editorial boards, publishers and bibliometric databases. However, because there are no universally accepted definitions or standardized rules for DT classification, a degree of subjectivity is unavoidable. This subjectivity often leads to questionable or even erroneous classifications. For instance, a *review* or a *note* might be misclassified as a research *article*, leading to several potential consequences. Beyond misleading researchers during document searches, these classification errors can distort bibliometric indicators for journals, individual researchers, and entire research institutions. Such distortions arise because bibliometric indicators often depend on the DT classification of the documents under

analysis. For instance, if a journal mislabels a substantial number of documents as *articles* rather than, say, *editorials* or *letters*, its *Journal Impact Factor* could be distorted: citations to those misclassified items would still be counted in the numerator, while the denominator (which includes only *articles* and *reviews*) might be inappropriately inflated or deflated (Haupka et al., 2024).

In some cases, these errors may even impact research evaluation exercises, which frequently include or exclude documents based on their DTs. For example, certain DTs – such as *proceedings papers*, *notes*, and *book chapters* – are often deemed less significant and are excluded from evaluations (García-Pérez, 2010; Franceschini et al., 2015; Yeung, 2019; Mokhnacheva, 2023). A *conference paper* erroneously classified as a journal *article* might grant a researcher undue credit in evaluations that prioritize journal publications, potentially influencing hiring, promotion, or funding decisions. Conversely, an important research contribution misclassified as a less prestigious DT (e.g., an *article* mislabelled as a *note*) could be undervalued in performance assessments.

Additionally, different research disciplines may be affected by misclassification of DTs in distinct ways. Fields that make heavy use of conference proceedings (e.g., *computer science* and *engineering*) may be particularly susceptible to misclassification between *conference papers* and journal *articles*, whereas disciplines that focus primarily on journal articles (e.g., *biology* and *medicine*) may be more concerned with distinguishing research *articles* from *reviews* or *editorial materials*.

Scientific literature on DT-classification errors is relatively sparse, primarily because such investigations typically involve samples of only a few hundred or thousand documents, requiring labour-intensive manual analysis. Recent studies suggest that DT-classification errors in general-purpose bibliometric databases, such as Web of Science (WoS) and Scopus, are non-negligible and account for a few percentage points (Franceschini et al., 2016a; Yeung, 2021; Donner, 2023; Zhu et al., 2024). These findings are corroborated by a recent study by Maisano et al. (2025), which introduces a semi-automated approach to detect potentially misclassified documents. This approach utilizes discrepancies between DT classifications assigned by competing databases, WoS and Scopus, to automatically identify subsets of potentially misclassified documents. Manual analysis, which is inherently time-consuming, can then be concentrated on this subset while excluding most documents, which are presumed to be correctly classified. This approach allows for an approximately two-order-of-magnitude increase in the size of analysed samples – e.g., from a few thousand to hundreds of thousands – without requiring additional manual-analysis effort. Maisano et al. (2025) analysed a sample of nearly 28,000 documents recently published by over 2,000 researchers affiliated with the two largest universities in Turin, Politecnico di Torino (PoliTO) and Università di Torino (UniTO). The study estimated overall error rates of approximately 2.3% for WoS and 2.7% for Scopus.

During the data collection for the research in (Maisano et al., 2025), an intriguing fact emerged: while most documents indexed by WoS and Scopus featured a single-DT classification, approximately 4% exhibited dual-DT classifications in WoS –

e.g., documents classified simultaneously as *editorial material*; *book chapter* or *article*; *proceedings paper* – whereas Scopus consistently applied single-DT classifications. These dual-DT classifications in WoS were excluded from the earlier study to avoid complicating the analysis.

It is important to clarify that in a dual-DT classification by WoS, up to two DTs in combination can be assigned to a single document. The most frequent combination involves one DT indicating the *content* type of the document (e.g., *article*, *review*, *letter*) and the other indicating the corresponding publication *container* (e.g., *proceedings paper*, *book chapter*, *journal*). However, other combinations of DTs are also possible. In contrast, Scopus' policy limits each document to a single DT label, forcing a choice even in cases where multiple DTs would be appropriate. This conceptual distinction is important, as some DTs are not mutually exclusive; in other words, sometimes a single document may legitimately fall under two DTs.

Building upon these observations, this study specifically focuses on this portion of documents with dual-DT classifications in WoS. The objectives are twofold: (i) to explore the reasons behind WoS's dual-DT assignments, likely indicative of greater classification challenges for these documents, and (ii) to compare WoS's dual-DT-assignment policy with Scopus's single-DT-assignment approach. Formally, the study addresses the following research questions, respectively:

RQ#1: *Is the error rate (for both WoS and Scopus) higher for documents with dual-DT assignments compared to those with single-DT assignments, confirming that the former are inherently more challenging to classify?*

RQ#2: *Based on the analysis, which approach – WoS's dual-DT assignments or Scopus's single-DT assignments – appears more reasonable?*

Methodologically, the study will conduct an exhaustive manual analysis of a *corpus* of documents of interest, assessing the accuracy of DT classifications in WoS and Scopus and attributing errors where detected. The remainder of this study is organized in three sections. The “Methodology” section details the methodological approach, including the sample selection, manual analysis procedure, and statistical measures to be constructed. The “Results” section presents the findings and relevant statistics, accompanied by descriptions, interpretations of the results, and practical examples. Finally, the “Conclusions” section summarizes the key findings, highlights practical implications for the scientific community, discusses limitations, and suggests directions for future research.

Methodology

As outlined in the “Introduction”, this study builds on the dataset used in Maisano et al. (2025), which combines publications authored by researchers affiliated with UniTO (a generalist university in Turin) and PoliTO (a technical university in Turin) during the 2019–2023 period. The choice of these two medium-to-large universities – with a combined total of over 100,000 students and approximately 2,000 tenured researchers, covering a wide range of scientific disciplines – ensures that the dataset of publications is diverse in terms of subjects, DTs, journals and publishers, making

it relatively representative of the entire recent scientific literature. These publications are indexed by both WoS and Scopus.

From an initial set of nearly 30,000 documents, 1,085 were identified as having dual-DT assignments by WoS. These documents constitute the *corpus* under investigation in this study. Table 1 provides a detailed classification of these documents by both databases. Notably, the DT labels assigned by WoS and Scopus do not always align, due to minor differences in DT naming conventions (e.g., *conference paper* in Scopus versus *proceedings paper* in WoS) and the inclusion or exclusion of certain specialized DTs (e.g., *expression of concern* and *meeting abstract* in WoS but not in Scopus). For further details, refer to the official DT lists provided by Scopus and WoS (Clarivate, 2025; Elsevier, 2025).

Table 1. Summary of DTs classified by WoS and Scopus for the 1,085 publications analysed in this study. DTs in each database are sorted in descending order based on the number of documents they include.

(a) DTs classified by WoS	No. of docs	(b) DTs classified by Scopus	No. of docs
<i>Article; Proceedings paper</i>	423	<i>Article</i>	767
<i>Article; Early access</i>	394	<i>Book chapter</i>	152
<i>Article; Book chapter</i>	146	<i>Conference paper</i>	54
<i>Article; Data paper</i>	45	<i>Review</i>	53
<i>Review; Early access</i>	44	<i>Data paper</i>	40
<i>Editorial material; Book chapter</i>	10	<i>Letter</i>	7
<i>Letter; Early access</i>	7	<i>Editorial</i>	6
<i>Editorial material; Early access</i>	5	<i>Erratum</i>	4
<i>Review; Book chapter</i>	5	<i>Note</i>	1
<i>Correction; Early access</i>	4	<i>Retracted</i>	1
<i>Article; Expression of concern</i>	1		
<i>Article; Retracted publication</i>	1		
Total no. of documents	1,085	Total no. of documents	1,085

Table 2 presents a matrix that highlights the similarities and discrepancies between the DT classifications in WoS (with DTs listed in the rows) and Scopus (with DTs listed in the columns) for the analysed documents. While some classifications appear consistent (e.g., the four documents classified as *correction; early access* in WoS and *erratum* in Scopus), others exhibit clear incompatibilities (e.g., the eight documents classified as *review; early access* in WoS but as *article* in Scopus).

Table 2. Matrix of DT classifications for the analysed documents, according to WoS (rows) and Scopus (columns). All 1,085 documents were manually analysed to identify potential classification errors.

DT classifications →		by Scopus										
↓		Article	Book chapter	Conf. paper	Review	Data paper	Letter	Editorial	Erratum	Note	Retracted	Row total
by WoS	Article; Proceedings paper	359	-	52	12	-	-	-	-	-	-	423
	Article; Early access	389	-	2	3	-	-	-	-	-	-	394
	Article; Book chapter	3	143	-	-	-	-	-	-	-	-	146
	Article; Data paper	5	-	-	-	40	-	-	-	-	-	45
	Review; Early access	8	-	-	36	-	-	-	-	-	-	44
	Editorial material; Book chapter	-	7	-	-	-	-	3	-	-	-	10
	Letter; Early access	-	-	-	-	-	7	-	-	-	-	7
	Editorial material; Early access	1	-	-	-	-	-	3	-	1	-	5
	Review; Book chapter	1	2	-	2	-	-	-	-	-	-	5
	Correction; Early access	-	-	-	-	-	-	-	4	-	-	4
	Article; Expression of concern	1	-	-	-	-	-	-	-	-	-	1
	Article; Retracted publication	-	-	-	-	-	-	-	-	-	1	1
	Column total		767	152	54	53	40	7	6	4	1	1

All 1,085 documents in the matrix were manually analysed to determine their "true" (or correct) DTs and identify any potential classification errors by the databases. The manual analysis was conducted shortly after data retrieval, in February 2024. Depending on the need, the following information was considered to determine the "true" DT(s) for each document, with a progressively deeper manual analysis where required:

- Title and abstract;
- Information and metadata provided on the journal and/or publisher's webpage;
- Formal structure of the document;
- Number of references cited within the document;
- Full text.

For each document, the accuracy of the DT classification provided by each database was assessed, also considering their respective DT definitions and presumed assignment rules. A logic of internal consistency was applied to establish whether a database's DT classification was correct or erroneous.

Results

This section is divided into two subsections: (i) the presentation of results from the perspective of WoS and Scopus, using so-called "error tables" (Maisano et al., 2025) and associated error statistics, and (ii) the practical interpretation of these results, supported by several pedagogical examples.

Error tables and error statistics

Error! Reference source not found. presents the error table for WoS, a contingency table that displays the DT classifications assigned by WoS in its columns and the "true" (or correct) DTs determined through manual analysis in its rows (Maisano et al., 2025). The main diagonal of the error table contains the correct DT classifications

– with the corresponding document counts shown in round parentheses "(·)" – while the off-diagonal elements represent incorrect classifications. Notably, while the columns include only the DTs listed in Table 1(a) for WoS, additional DTs appear in the last rows of **Error! Reference source not found.**, denoted by the symbol "(*)" – including one with dual-DT classification "*review; proceedings paper*" at the top. These additional DTs were introduced because the manual analysis revealed misclassifications that were corrected by assigning more appropriate DT classifications, following WoS's declared rules (Clarivate, 2025).

Table 3. Error table for WoS. Quantities in "(·)" represent correctly classified documents, "[·]" denote *partial* errors (with weight ½), and "{·}" indicate *full* errors. Statistics α_i and β_j were calculated only for groups with at least 30 documents for statistical reliability. The symbol "(*)" denotes additional DTs added following manual analysis.

	DT classification by WoS												Row total	Total "{·}" row errors	Total "{·}" row errors	α_i
	Article; Proceed. paper	Article; Early access	Article; Book chapter	Article; Data paper	Review; Early access	Editorial material; Book chapter	Letter; Early access	Editorial material; Early access	Review; Book chapter	Correction, Early access	Article; Expression of concern	Article; Retracted publication				
Article; Proceedings paper	(409)	[2]	-	-	-	-	-	-	-	-	-	-	411	0	2	0.2%
Article; Early access	-	(329)	-	-	-	-	-	-	-	-	-	-	329	0	0	0.0%
Article; Book chapter	-	-	(145)	-	-	-	-	-	-	-	-	-	145	0	0	0.0%
Article; Data paper	-	-	-	(45)	-	-	-	-	-	-	-	-	45	0	0	0.0%
Review; Early access	-	[1]	-	-	(33)	-	-	-	-	-	-	-	34	0	1	1.5%
Editorial material; Book chapter	-	-	-	-	-	(8)	-	-	-	-	-	-	8	0	0	-
Letter; Early access	-	-	-	-	-	-	(6)	-	-	-	-	-	6	0	0	-
Editorial material; Early access	-	-	-	-	-	-	-	(3)	-	-	-	-	3	0	0	-
Review; Book chapt.	-	-	-	-	-	-	-	-	(5)	-	-	-	5	0	0	-
Correction, Early access	-	-	-	-	-	-	-	-	-	(4)	-	-	4	0	0	-
Article; Expression of concern	-	-	-	-	-	-	-	-	-	-	(1)	-	1	0	0	-
Article; Retracted publication	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-
Review; Proceedings paper ^(*)	[12]	-	-	-	[1]	-	-	-	-	-	-	-	13	0	13	-
Article ^(*)	-	[58]	-	-	[2]	-	-	-	-	-	-	[1]	61	2	59	-
Review ^(*)	-	[3]	-	-	[8]	-	-	-	-	-	-	-	11	3	8	-
Letter ^(*)	-	-	-	-	-	[1]	-	-	-	-	-	-	1	0	1	-
Editorial material ^(*)	{1}	-	{1}	-	-	-	-	-	-	-	-	-	2	2	0	-
Book chapter ^(*)	-	-	-	-	-	[2]	-	-	-	-	-	-	2	0	2	-
Proceedings paper ^(*)	[1]	-	-	-	-	-	-	-	-	-	-	-	1	0	1	-
Other ^(*)	-	{1}	-	-	-	-	{2}	-	-	-	-	-	3	3	0	-
Column total	423	394	146	45	44	10	7	5	5	4	1	1	1,085			
Total "{·}" column errors	1	4	1	0	2	0	0	2	0	0	0	0		10		
Total "[·]" column errors	13	61	0	0	9	2	1	0	0	0	0	1			87	
β_j	1.8%	8.8%	0.7%	0.0%	14.8%	-	-	-	-	-	-	-				$\varepsilon \cong 4.9\%$

Among the off-diagonal elements, two types of errors can be distinguished:

- *Full* errors (quantities denoted in curly brackets "{·}"), representing cases where both DTs assigned by WoS are incorrect.
- *Partial* errors (quantities denoted in square brackets "[·]"), involving cases where one of the two assigned DTs is correct, while the other is incorrect.

Partial errors are weighted with a score of $\frac{1}{2}$, as they represent an intermediate level of error between fully incorrect DT assignments (score of 1) and correct DT assignments (score of 0). The content of the error table can be summarized using an overall (weighted) error rate:

$$\varepsilon = \frac{d^{\{ \}} + \frac{1}{2} \cdot d^{[\]}}{d^{\{ \}} + d^{[\]} + d^{(\)}} \quad (1)$$

where:

$d^{\{ \}} = \sum_{i,j} d_{i,j}^{\{ \}}$ is the total number of documents with *full* errors in the error table;
 $d^{[\]} = \sum_{i,j} d_{i,j}^{[\]}$ is the total number of documents with *partial* errors in the error table;
 $d^{(\)} = \sum_{i,j} d_{i,j}^{(\)}$ is the total number of correctly classified documents in the error table.

The denominator of the fraction in Eq. 1 represents the sum of all three document categories, which amounts to 1,085. For WoS, the number of *partial* errors ($d^{[\]} = 87$) is significantly higher than the number of *full* errors ($d^{\{ \}} = 10$). Moreover, the error rate for WoS (~4.9%) is markedly higher than the rate observed in the previous study (~2.3%) for documents with single-DT assignments (Maisano et al., 2025). A statistical test on the difference between the two proportions confirmed this rigorously (Ross, 2017). Addressing RQ#1, it can be concluded that documents with dual-DT classifications in WoS are inherently more challenging to classify, as they exhibit a significantly higher propensity for misclassification.

Beyond the overall error rate (ε), additional error statistics can be constructed. Specifically, for each row i , the probability that a document belonging to a given DT is wrongly classified into another DT (i.e., *missing assignment to the DT of interest*) is:

$$\alpha_i = \frac{\sum_j d_{i,j}^{\{ \}} + \frac{1}{2} \cdot \sum_j d_{i,j}^{[\]}}{\sum_j d_{i,j}^{\{ \}} + \sum_j d_{i,j}^{[\]} + \sum_j d_{i,j}^{(\)}} \quad (2)$$

For each column j , the probability of misclassifying a document into the specific DT of that column (i.e., *false classification into the DT of interest*) is:

$$\beta_j = \frac{\sum_i d_{i,j}^{\{ \}} + \frac{1}{2} \cdot \sum_i d_{i,j}^{[\]}}{\sum_i d_{i,j}^{\{ \}} + \sum_i d_{i,j}^{[\]} + \sum_i d_{i,j}^{(\)}} \quad (3)$$

These statistics (α_i and β_j) were calculated only for groups with at least 30 total documents (in rows or columns) to ensure statistically reliable estimates. The statistics indicate that several errors involve journal documents with dual-DT assignments including the *early-access* designation, despite being already published in their final form (i.e., with specific volume/issue numbers and definitive page numbers). However, these errors are not particularly severe for two reasons:

1. They do not fundamentally alter the “true” nature of the document; they simply attach an erroneous (temporary) designation of *early access*;

- From a follow-up investigation conducted approximately 10 months after data collection (December 2024), it was found that over 80% of these inaccuracies had been corrected by WoS.

A smaller proportion of errors involves *conference proceedings papers* misclassified as *articles*, although they are actually *reviews* or *surveys*.

For Scopus (see the relevant error table in Table 4), no dual-DT assignments appear, as this database only permits single-DT classifications (Elsevier, 2025). Consequently, only *full* errors are observed, with an error rate of $\varepsilon = \frac{86}{1,085} \cong 7.9\%$, significantly higher than the 2.7% reported in the previous study (Maisano et al., 2025). Statistical testing confirmed the significance of this difference. Scopus appears to encounter even greater challenges than WoS when classifying these particularly delicate documents. The distribution of errors in Scopus reveals that many articles are misclassified as *conference papers*, while others classified as *articles* belong to more specific DTs (e.g., *reviews*, *book chapters*, *data papers*). As explored in the next subsection, the root cause of these errors often lies in the limitations of Scopus's DT definitions and its strict single-DT-assignment policy.

Interpretation of results

This subsection provides an interpretation of the most significant results of the analysis, supported by numerous practical examples. Three typical scenarios were observed in which WoS assigns dual-DT classifications, each of which is analysed individually below:

- Combination of a DT related to a document's *content* and a DT related to the *container* (or dissemination context);
- Early-access* documents, typically linked to scientific journals;
- Classification of uncommon, specialized documents from scientific journal.

Table 4. Error table for Scopus. Quantities in "(·)" represent correctly classified documents, while "{·}" denote *full* errors. Statistics α_i and β_j were calculated only for groups with at least 30 documents for statistical reliability. The symbol "(*)" denotes additional DTs added following manual analysis.

	DT classification by Scopus										Row total	Total row errors	α_i
	Article	Book chapter	Conf. paper	Review	Data paper	Letter	Editorial	Erratum	Note	Retracted			
"True" DT classifications	Article	(745)	-	{52}	{4}	-	-	-	-	{1}	802	57	7.1%
	Book chapter	{3}	(147)	-	-	-	-	-	-	-	150	3	2.0%
	Conf. paper	-	-	(1)	-	-	-	-	-	-	1	0	-
	Review	{11}	{1}	{1}	(48)	-	-	-	-	-	61	13	21.3%
	Data paper	{5}	-	-	(40)	-	-	-	-	-	45	5	11.1%
	Letter	-	-	-	-	(7)	-	-	-	-	7	0	-
	Editorial	{1}	{4}	-	-	-	(6)	-	-	-	11	5	-
	Erratum	-	-	-	-	-	-	(4)	-	-	4	0	-
	Note	{2}	-	-	-	-	-	-	(1)	-	3	2	-
	Retracted	-	-	-	-	-	-	-	-	-	0	0	-
	Short survey ^(*)	-	-	-	{1}	-	-	-	-	-	1	1	-
Column total	767	152	54	53	40	7	6	4	1	1	1,085		
Total column errors	22	5	53	5	0	0	0	0	0	1		86	
β_j	2.9%	3.3%	98.1%	9.4%	0.0%	-	-	-	-	-			$\varepsilon \cong 7.9\%$

(1) Combination of a DT related to *content* and a DT related to the *container*. A common pairing observed involves (i) a DT describing the document's *content* in terms of objectives and structure (e.g., research *article*, *review*, *letter*), and (ii) a DT related to the *container*, representing the dissemination context (e.g., *journal*, *conference proceedings*, *book chapter*). Specifically, WoS seems to include the container DT only for scientific publications that differ from *journal* contributions¹. This practice is consistent with the WoS definition of *proceedings paper*, which states, “*proceedings papers will have a dual document type: article; proceedings paper*”, though no similar rule exists for *book chapters*, which are defined only as “*a monograph or publication written on a specific topic within a main division in a book*” (Clarivate, 2025). On the other hand, Scopus, constrained by its single-DT-assignment policy, provides systematically less detailed classifications and occasionally misleading ones. The examples below document some of the most common and/or curious errors observed for both databases.

- For example, Scopus defines a *book chapter* as “*a complete chapter in a book or book-series volume, identified as a chapter by a heading or section indicator*”. However, some special *book chapters*, such as book series introductions, are often classified by Scopus as *editorial*. Additionally, inconsistencies arise because some book-series *editorials* are still classified as *book chapters*. These internal inconsistencies in Scopus are generally avoided by WoS due to its dual-DT-assignment policy.

For example, documents 1.1 to 1.5 in Table 5 pertain to *book chapters*. The first three are from the same book but differ in content: the first is an *introduction* to the whole book, the second is a classic research *article* (complete with methodology, results, discussion, etc.), and the third contains concluding notes related to the whole book. WoS assigns the container-DT *book chapter* to all three, pairing it with a content-DT: *article* for the second and *editorial material* for the introduction and conclusions, consistent with its definition of *editorial material* (Clarivate, 2025). Conversely, Scopus classifies the first document as *editorial* (but not as *book chapter*), while the other two are classified as *book chapters* (but not as *article* or *editorial*). Although this DT classification is not exactly wrong, it is undoubtedly less detailed and potentially more misleading than that of WoS.

Focusing on documents 1.4 and 1.5 in Table 5, both from another book, WoS not only classifies them correctly as *book chapters* but also distinguishes their content by assigning the additional DTs *review* and *article*, respectively. In contrast, Scopus's classification, while accurate, assigns only the single DT *book chapter* to both contributions.

¹ In fact, the DT *journal* is not envisaged by WoS as it is implied when the database makes a single-DT assignment related to the document's content, such as *article*, *review* or *letter*.

Table 5. Examples of documents with peculiar DT classifications, discussed in the analysis.

Ref. DOI	DT classification		Brief description
	WoS	Scopus	
1.1 https://doi.org/10.1007/978-3-319-71837-8_1	<i>Editorial material; book chapter</i>	<i>Editorial</i>	Introductory chapter of a book divided into chapters.
1.2 https://doi.org/10.1007/978-3-319-71837-8_10	<i>Article; book chapter</i>	<i>Book chapter</i>	Chapter corresponding to a research <i>article</i> .
1.3 https://doi.org/10.1007/978-3-319-71837-8_12	<i>Editorial material; book chapter</i>	<i>Book chapter</i>	Concluding chapter of a book divided into chapters.
1.4 https://doi.org/10.1007/978-3-319-79084-8_2	<i>Review; book chapter</i>	<i>Book chapter</i>	Same as 1.2, but corresponding to a <i>review</i> .
1.5 https://doi.org/10.1007/978-3-319-79084-8_3	<i>Article; book chapter</i>	<i>Book chapter</i>	Same as 1.2.
2.1 https://doi.org/10.1111/odi.13076	<i>Article; proceedings paper</i>	<i>Conf.</i>	<i>Review</i> published in a journal special issue dedicated to a medical workshop (7 th WWOM).
3.1 https://doi.org/10.5004/dwt.2018.22308	<i>Article; proceedings paper</i>	<i>Article</i>	<i>Article</i> in a journal special issue dedicated to an international conference (CEST 2017).
3.2 https://doi.org/10.5004/dwt.2018.22995	<i>Article; proceedings paper</i>	<i>Article</i>	Same as 3.1.
3.3 https://doi.org/10.5004/dwt.2019.24424	<i>Article; proceedings paper</i>	<i>Article</i>	<i>Article</i> in a journal special issue dedicated to an international conference (NAXOS 2018).
3.4 https://doi.org/10.5506/APhysPolB.51.1627	<i>Article; proceedings paper</i>	<i>Article</i>	<i>Article</i> in a journal (Acta Physica Polonica B) exclusively dedicated to conference proceedings.
3.5 https://doi.org/10.5506/APhysPolB.51.655	<i>Article; proceedings paper</i>	<i>Article</i>	Same as 3.4.
3.6 https://doi.org/10.5506/APhysPolB.51.661	<i>Article; proceedings paper</i>	<i>Article</i>	Same as 3.4.
3.7 https://doi.org/10.1200/JCO.18.00053	<i>Article; proceedings paper</i>	<i>Article</i>	In the “Prior presentation” section of this journal <i>article</i> , it is stated that the contribution was presented in three different conferences held in 2017 and 2018.
4.1 https://doi.org/10.1002/bmb.21490	<i>Editorial material; early access</i>	<i>Article</i>	Christmas song called “ <i>Oxidosqualene (OS) cyclase—Lanosterol synthase</i> ”, appearing in the scientific journal (Biochemistry and Molecular Biology Education), which classifies the paper with the specialized DT <i>the lighter side</i> .
4.2 https://doi.org/10.1002/alz.13526	<i>Article; early access</i>	<i>Article</i>	In the “Presentations” section of this journal <i>article</i> , it is stated that the contribution was presented at three different conferences held in 2021 and 2023. Following its final publication, WoS's <i>early-access</i> designation was removed, leaving the single DT <i>article</i> .
4.3 https://doi.org/10.1002/hon.3184	<i>Article; early access</i>	<i>Article</i>	Before the abstract, it is stated that “ <i>Preliminary results were presented as an abstract and oral presentation at the 63rd ASH Annual Meeting & Exposition in 2021</i> ”. Following its final publication, WoS's <i>early-access</i> designation was removed, leaving the single DT <i>article</i> .
5.1 https://doi.org/10.1002/ecy.2448	<i>Article; data paper</i>	<i>Article</i>	Document published in a journal as a <i>data paper</i> , containing detailed information on the dataset used for a research <i>article</i> with its DOI provided.

Ref. DOI	DT classification		Brief description
	WoS	Scopus	
5.2 https://doi.org/10.1016/j.dib.2018.10.142	Article; data paper	Article	Same as 5.1, but classified as a <i>data article</i> .
5.3 https://doi.org/10.1016/j.dib.2018.11.129	Article; data paper	Article	Same as 5.2.
6.1 https://doi.org/10.1007/978-1-0716-0603-2_5	Article; book chapter	Book chapter	Special document consisting of a <i>protocol</i> published in a book dedicated to <i>operational methods and protocols</i> in medicine/biology.
6.2 https://doi.org/10.1007/978-1-0716-0611-7_11	Article; book chapter	Book chapter	Same as 6.1.
6.3 https://doi.org/10.1007/978-1-0716-0978-1_14	Article; book chapter	Book chapter	Same as 6.1.
6.4 https://doi.org/10.1007/978-1-0716-0978-1_25	Article; book chapter	Book chapter	Same as 6.1.
6.5 https://doi.org/10.1007/978-1-0716-0978-1_27	Article; book chapter	Book chapter	Same as 6.1.
6.6 https://doi.org/10.1007/978-1-0716-0978-1_38	Article; book chapter	Book chapter	Same as 6.1.
6.7 https://doi.org/10.1007/978-1-0716-0978-1_40	Article; book chapter	Book chapter	Same as 6.1.
6.8 https://doi.org/10.1007/978-1-0716-1174-6_14	Article; book chapter	Book chapter	Same as 6.1.
6.9 https://doi.org/10.1007/978-1-4939-7584-6_8	Article; book chapter	Book chapter	Same as 6.1.
6.10 https://doi.org/10.1007/978-1-4939-8837-2_3	Article; book chapter	Book chapter	Same as 6.1.
6.11 https://doi.org/10.1007/978-1-4939-8982-9_15	Article; book chapter	Book chapter	Same as 6.1.
6.12 https://doi.org/10.1007/978-1-4939-9873-9_5	Article; book chapter	Book chapter	Same as 6.1.

- Another common pairing of content-related and container-related DTs concerns contributions derived from conferences. These contributions, primarily articles, are commonly classified by WoS as *article; proceedings paper*, accounting for ~40% of the documents with dual-DT assignments (i.e., 423 out of 1,085; see Table 1). Although WoS's official definitions for *article* and *proceedings paper* are somewhat convoluted and appear to reference dual DTs only in specific cases, empirical observation shows that WoS systematically applies dual-DT assignments for *articles* published in special issues derived from conferences.
- An exception to the previous point arises for *reviews* originating from conferences. According to WoS's official definition: "*Review articles that were presented at symposium or conference will be processed as proceedings papers*" (Clarivate, 2025), which means that such papers are classified as pure *proceedings papers* without dual-DT assignments. This choice appears inconsistent with the dual-DT-assignment policy for *article; proceedings paper*. It would likely be more consistent to also allow dual-DT assignments such as *review; proceedings paper*. For example, document 2.1 in Table 5 is a *review* clearly derived from a conference, as explicitly stated in the journal special issue where it appears.

However, WoS erroneously classifies it as *article*; *proceedings paper* instead of *review*; *proceedings paper*.

- From Scopus's perspective, articles from journal special issues linked to conferences are simply classified as *articles*, effectively equating them with "pure" journal articles, which are typically subjected to a more rigorous selection process. For instance, documents 3.1 to 3.7 in Table 5 come from three different conferences: the first three, linked to CEST 2017 and NAXOS 2018, were published in special issues of the journal *Desalination and Water Treatment*. The next three, from the *Random Matrix Theory* conference in Kraków, appeared in *Acta Physica Polonica B*, a journal exclusively dedicated to conference proceedings. The final document (3.7) was published in a regular issue of the *Journal of Clinical Oncology* but had been presented at three different conferences². Both WoS and Scopus correctly classify these seven documents based on their internal criteria. However, as with *book chapters*, Scopus's convention for journal special issues results in a loss of information regarding their conference origin, effectively conflating them with pure journal articles. This sort of "promotion" can impact bibliometric indicators – at the journal, researcher, or institutional level – which may not always differentiate between regular and special issues of journals (Franceschini et al., 2019).

(2) Early-access documents. A substantial portion of the analysed documents (i.e., 454 out of 1,085, corresponding to ~42%; see Table 1) received dual-DT assignments in WoS, where the primary DT refers to the content of the contribution, typically in a scientific journal (*article*, *correction*, *review*, or *editorial material*), and the secondary DT corresponds to the temporary designation of *early access*. This designation indicates that the contribution has been accepted and made publicly available online but has not yet appeared in its final editorial format (e.g., with volume, issue number, and definitive page numbers). The points below summarise some curious aspects observed regarding this category of documents.

- Although Scopus officially includes *article in press* among its defined DTs (Elsevier, 2025), it does not appear to use this designation in practice. As a result, documents labelled as *early access* in WoS generally do not pose classification issues for Scopus, except for occasional misclassifications between *article* and *review* – a phenomenon already observed in previous studies (Donner, 2023; Haupka et al., 2024; Zhu et al., 2024; Maisano et al., 2025).
- Returning to WoS, the manual analysis revealed that *early-access* documents are generally classified correctly, except for some misclassifications of the primary DT, particularly between *article* and *review*. Regarding the secondary *early-access* DT, ~85% of the analysed documents were found to be correctly classified.

² In fact, a dedicated section of the paper, named "Prior Presentation", reads: "Presented at the 59th Annual Meeting of the American Society of Hematology, Atlanta, GA, December 9-12, 2017; the meeting of the American Society of Blood and Marrow Transplantation, Salt Lake City, UT, February 21-25, 2018; and the 16th International Umbilical Cord Blood Symposium, San Diego, CA, June 14-16, 2018".

However, ~15% were already in their final editorial format, meaning the temporary *early-access* designation should have been removed. As noted in the previous subsection, this inaccuracy does not appear to be particularly severe. Furthermore, a follow-up check conducted in December 2024 (approximately eight months after the initial data retrieval and analysis) revealed that nearly all previous anomalies had been corrected by WoS (Franceschini et al., 2016b).

- As an anecdote, one document (document 4.1 in Table 5) highlights a rare double misclassification. This unique document – a *Christmas song* published in a scientific journal – was not only no longer *early access* but was also misclassified by WoS as *editorial material*. A more appropriate classification might have been *other*. Scopus also misclassified it too as an *article*, whereas *note* would probably have been a more suitable designation.
- Another curious observation involves *early-access* designations for articles in journal special issues or extended versions of conference contributions. Occasionally, this temporary designation seems to "overwrite" a potential secondary DT of *proceedings paper*. Once the article, initially classified as *article; early access*, is published in its final form, WoS does not appear to replace *early access* with *proceedings paper*, which would seem appropriate as it is typically associated with journal articles originating from conferences, as previously documented. For instance, consider documents 4.2 and 4.3 in Table 5. Both are extended versions of articles originally presented in conference proceedings. However, they do not carry the dual-DT assignment *article; proceedings paper* once published in their final form. It appears that the temporary *early-access* designation displaces the secondary *proceedings paper* DT, and the database fails to reinstate it after final publication. This observation warrants further investigation in future studies. While Scopus's policy of assigning only a single DT introduces potential inaccuracies, WoS's limit of a maximum of two DTs may sometimes lead to inaccuracies, as exemplified by the issue discussed above.

(3) Uncommon, specialized journal documents. A less frequent scenario in which WoS assigns dual DTs involves documents published in journals that differ from traditional contributions (*articles, reviews, letters, etc.*). Below are some of the most interesting cases observed.

- Among these less common documents, we identified forty-five so-called *data papers*, which are essentially documents containing detailed datasets that support other scientific contributions (typically journal articles) to which they are linked. According to its internal rule, WoS classifies these contributions with a dual-DT assignment: *article; data paper* (cf. the definition: "*A data paper will have a dual document type: article; data paper*" (Clarivate, 2025)). Conversely, Scopus, despite having a dedicated *data-paper* DT (Elsevier, 2025), sometimes classifies these documents simply as *articles*. Table 5 lists three examples of such documents (5.1 to 5.3). The most critical consequence of these inaccuracies is the undue "promotion" of *data papers* to the level as journal *articles*.

- Among the less common documents with dual DTs in WoS, we also found one classified as *article; retracted* and another as *article; expression of concern*. Scopus, in comparison, categorized these documents into its dedicated *retracted* and *article* categories, respectively.
- Finally, we draw attention to another uncommon category of documents: *protocols* or *methods and protocols*. These documents, which primarily detail best practices in medicine/biology, do not have a direct counterpart in the DT categories of either WoS or Scopus. Since these contributions appear almost exclusively in book series, Scopus indexed them – correctly, in our view – as *book chapters*, while WoS assigned them the dual DT *article; book chapter*. While WoS’s classifications were not deemed erroneous in our analysis, it might have been more appropriate to classify these documents as *other; book chapter*. In fact, the content of these *protocols* often lacks the structure of canonical articles, making the *article* designation less fitting. Table 5 exemplifies the twelve documents (6.1 to 6.12) identified during the analysis.

Conclusions

This research focused on scientific documents with dual-DT assignments in WoS, which – based on a preliminary estimate – constitute ~4% of all indexed documents. The aim was to identify potential issues in DT classification, not only from the perspective of WoS but also Scopus. Manual analysis of a *corpus* of 1,085 documents revealed that documents with dual DTs are more prone to classification errors than those with single DTs: error rate of 4.9% versus 2.3% for WoS and 7.9% versus 2.7% for Scopus. Thus, addressing **RQ#1**, it can be concluded that these documents significantly differ from those with single DTs, as confirmed by appropriate statistical tests.

In general, three main scenarios were identified where WoS uses dual-DT classification:

1. Cases where the primary DT specifies the *content* type (e.g., *article*, *review*, *letter*), while the secondary DT specifies the *container* (e.g., *book chapter*, *proceedings paper*), if different from the journal container implicitly referenced by WoS for single-DT classifications.
2. Less common and specialized documents usually published in journals. These documents are relatively few and do not significantly impact overall error statistics. In cases where the specific DT is not covered by the database's predefined categories, we suggest avoiding overuse of the DT *article* and instead replacing it with a "catch-all" DT *other*. This would avoid various undue “promotions”.
3. Documents temporarily assigned the *early-access* secondary DT, while awaiting their final published format. A notable number of errors stemmed from the failure to update *early-access* journal documents (*articles*, *reviews*, *letters*, etc.) in WoS after their final publication.

The analysis also revealed that some DT-classification errors may stem from inconsistencies or ambiguities in DT definitions. For instance, WoS’s definition of

book chapter and Scopus's definitions of *article* exhibit certain ambiguities. Nevertheless, allowing dual-DT assignments in WoS serves as a "safety net" to avoid relatively severe errors, which Scopus sometimes encounters. For WoS, cases where both assigned DTs are incorrect (*full errors*) represent only 10 out of 1,085 documents, whereas in 87 cases, one of the assigned DTs was correct (*partial errors*). Scopus's strict single-DT assignment policy appears to be a relevant cause of its misclassifications. This limitation arises from the simple fact that DTs are not always mutually exclusive; in some cases, multiple DTs may be valid simultaneously (e.g., a *review* and a *conference paper*). Although forcing a single-DT assignment might seem like a simplification, this approach can lead to potential errors, such as undue "promotion" (e.g., from *proceedings paper* to journal *article*) or, at least, a loss of information about the documents in question. For this reason, WoS's policy of allowing dual-DT assignments seems more prudent (**RQ#2**). From a practical standpoint, it might even make sense to use up to three DTs in certain cases: one for *content*, one for the *container*, and one for an *accessory* designation (e.g., *early access*, *retracted*, etc.).

The findings of this study have practical implications for several stakeholders. For individual researchers, they may provide additional guidance for collecting and selecting documents from scientific literature through databases. For bibliometric indicator developers, this study raises awareness of potential distortions caused by DT classification errors, which have been at least preliminarily quantified here. For database managers, the comparative analysis of current DT-assignment policies could inform future improvements in DT definitions and their assignment logic.

In general, we recommend that database providers refine and clarify their DT classification guidelines to minimize ambiguities (e.g., clearly distinguishing an *article* from an *editorial material* or *proceedings paper*) and consider integrating AI-based tools to assist in the DT classification process. Automated checks – using machine learning trained on document metadata and *full texts* – could help flag inconsistent or unlikely DT assignments for human review, thus improving the overall accuracy of the databases. Additionally, relaxing the current WoS-imposed limit of two DTs to allow a third DT could be a reasonable step forward.

Furthermore, it would be useful to consider how other bibliometric databases handle DT classification to put these findings in context. For example, the *Dimensions* bibliometric platform (developed by Digital Science) combines publisher metadata and machine learning to assign DTs and links them to research grants, patents, and policy outputs (Digital Science, 2025). Open scholarly platforms like *OpenAlex* rely largely on publisher-provided metadata (via *Crossref*) for DTs, resulting in a broader but less standardized set of DTs. Studies have shown that DTs can differ considerably between providers, and what counts as a "research" document versus "non-research" can vary by database. These discrepancies underscore the absence of a universal standard for DT classification across database, which can complicate cross-database comparisons. Our findings and recommendations align with recent calls for richer and more consistent DT metadata in bibliometric data sources (Haupka et al., 2024).

The primary limitation of this research is the relatively small sample size (1,085 documents), which may hinder the generalizability of the findings. In future work, we aim to extend the sample size to provide a more comprehensive analysis.

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Author Index

Abhirup Nandy	342, 1210	Denis Kosyakov	823
Alesia Zuccala	745, 837	Dimity Stephen	837
Alessio Vaccari	89	Domenico A. Maisano	968
Alex Rushforth	66	Dong Yu Wu Jiaxin	659
Alexander Schniedermann	837	Edita Gzoyan	447, 784
Alysson Fernandes	214	Edwin Garces	631
Mazoni		Eline Vandewalle	128
Andrea Bonaccorsi	16	Elisabeth Browning	198
Antonio Perianes-Rodríguez	427	Erija Yan	117, 837
Anurag Kanaujia	1210	Esteban Fernandez Tuesta	214
Aram Mirzoyan	447	Estevão Fernandes	214
Ashraf Maleki	928	Macedo	
Asselya Makanova	1139	Fakhri Momeni	1196
Birgit Houben	37	Fiorenzo Franceschini	968
Brigitta Németh	804	Flavia Di Costa	362
Brigitte Mathiak	1196	Francis Lareau	1124
Cameron Neylon	837	Frans van der Sluis	745
Carolina Coimbra Vieira	386	Gabriel Alves Vieira	499
Chao Min	47	Gaël Bernard	149
Chenggang Yang	585	Gang Li	1036
Chengzhi Zhang	525, 585, 677, 758	Gevorg Kesoyan	447
Chiaki Miura	142	Giovanni Abramo	784
Christophe Malaterre	1124	Giulia Malaguamera	101
Chun-Chieh Wang	951	Guendalina Capece	362
Chung-Huei Kuan	703	Guijie Zhang	47
Chunjiang Liu	631	Guillaume Roberge	198
Cinzia Daraio	3, 6, 89, 362, 473	Gulnaz Alibekova	1139
Ciriaco Andrea D'Angelo	784	Gunnar Sivertsen	66, 837, 1012
Cristina Arhiliuc	128	Haakon Lund	745
Dar-Zen Chen	951	Haiyun Xu	174, 631
David Campbell	198	Halil Kilicoglu	1107
David Moher	837	Hamid R. Jamali	1089
		Hao Yueru	862
		Henry Liu	837
		Hiran H Lathabai	342

Hiroshi Hashizume	142	Liu Xiaojuan	718
Hongmei Guo	563	Liu Xiwen	237
Hongrui Yang	1060	Lottie Provost	101
Hongye Zhao	677	Lucrezia Ferrara	968
Hsiao Tsung-Ming	1158	Ludo Waltman	837
Huei-Ru Dong	553	Luís Fabiano Farias	214
Hui Xu	758	Borges	
Hui Zhang	890	Lutz Bornmann	81, 294,
Huiwen Bai	758		837, 876,
Huizhen Fu	47		1176
I. M. Jakaria Rahman	253	Rodrigo Costas	837
Iana Atanassova	1124	M. Janina Sarol	1107
Jacopo Orsini	473	Ma Tingcan	862
Jacqueline Leta	499	Mabel Ayure-Urrego	112
Jamal El-Ouahi	615	Mahmoud Hemila	149
Janete Saldanha Bach	1196	Marc Bertin	401
Jens Peter Andersen	837	Marco Malgarini	460
Jeremy Y. Ng	837	Marco Schirone	253
Jiahao Li	119	Marco Solmi	837
Jiahui Li	174	Marek Kosmulski	110
Jiajie Wang	1267	María Alejandra Tejada-	112
Jianhua Liu	119	Gómez	
Jin Mao	1036	Mariam Yeghikyan	447
Jing Ma	47	Marianna Lehtisaari	928
Jing Shi	319	Marianne Gauffriau	837
Juan Gorraiz	3, 6, 159	Marilena Maniaci	460
Julian Alvarez	401	Marisa Vasconcelos	386
Julian Dederke	149	Mehvish Masood	837
Kayvan Kousha	914	Mengjia Wu	1176
Kim Holmberg	928	Michel Sabé	837
Kiran Sharma	1227	Michelle Koch	149
Lanfeng Ni	758	Mike Thelwall	71, 914
László Lőrincz	804	Ming Cheng	563
Lata Kashyap	985	Mingliang Yue	269
Lele Kang	1267	Mingyue Sun	269
Liao Yu	563	Mu-Hsuan Huang	553
Lin Zhang	66, 117,	Natalia Manola	101
	890,	Nicolas Gutehrle	1124
	1012	Nicolas Robinson-Garcia	837

Níliek Silva-Alés	427	Tindaro Cicero	460
Niveen Syed	837	Tingcan Ma	269
Panggih Kusuma Ningrum	1124	Torger Möller	302
Patrik Bergvall	253	Tsubasa Sakamoto	142
Paul Donner	223, 294	Verena Weimer	837
Peter Mutschke	1196	Vivek Kumar Singh	342,
Philippe Dittmann	302		1210
Philippe Vincent-Lamarre	223	Weishu Liu	47
Pieter Spooren	37	Wen Peng	269
Prashasti Singh	342,	Wolfgang Glänzel	3, 6, 837
	1210	Wudan Ma	631
Qianfei Tian	1246	Xian Zhang	174, 631
Robin Haunschild	81, 117,	Xiang Nannan	718
	294, 876,	Xiao Liu	319
	1176	Xiaoling Cheng	1267
Ronald Rousseau	31, 1060	Xiaoyan Zhang	1060
Sandhiya Laksmanan	985	Xiaoyu Wang	631
Sanfa Cai	1060	Xin An	119
Shan Huang	1036	Xinyi Peng	319
Shengnan Wang	119	Xinyu Deng	758
Shuai Chen	525	Xizhen Qiao	319
Shuo Xu	119	Ye Chen	319
Shushanik Sargsyan	447, 784	Yi Bu	47
Shuying Li	174, 631	Yi Zhang	1176
Simon Hunanyan	447	Yi Zhao	677
Simon Willemin	149, 837	Ying Huang	47, 890
Simone Di Leo	473	Yoshiyasu Watanabe	142
Sisi Li	1060	You-Fu Lee	951
Stefanie Haustein	837	Yu Yao	718
Stephan Stahlschmidt	294, 837	Yue Mingliang	862
Sujit Bhattacharya	985	Yuefu Zhang	119
Sybille Hinze	837	Yunwei Chen	1246
Szu-Chia Lo	703	Yuxian Liu	1060
Tamás Felföldi	804	Zenia Xenou	101
Tang Muh-Chyun	1158	Zhe Cao	890,
Thed van Leeuwen	837		1012
Thierry Lafouge	401	Zheng Ma	563
Thomas Scheidsteger	876	Zheng Xinman	237
Tim C.E. Engel	37	Zhenglu Yu	563

Zhihan Wan	1012	Zihui Li	758
Zhiqiang Zhang	1246	Ziya Uddin	1227
Zhixiang Wu	47	Zou Xinran	659