From Accomplished to Awarded – A Quantitative Study of International Scientific Award Winners in Computer Science

Péter Sasvári[1], Gergely Ferenc Lendvai[2], Noémi Hajdú[3]

[1]Ludovika University of Public Service, Ludovika tér 2, H-1083 Budapest, Hungary; University of Miskolc, Egyetem út 1, Miskolc-Egyetemváros, H-3515 Miskolc, Hungary, sasvari.peter@uni-nke.hu

[2]Ludovika University of Public Service, Ludovika tér 2, H-1083 Budapest, Hungary, lendvai.gergely.ferenc@stud.uni-nke.hu

[3] University of Miskolc, Egyetem út 1, Miskolc-Egyetemváros, H-3515 Miskolc, Hungary, noemi.hajdu1@uni-miskolc.hu

Abstract: We examine the publication practices of international award winners in the field of computer science. Our main objective was to identify the preferred publishers, publication formats and thematic focus of award-winning researchers and assess how these factors contribute to their academic visibility and career progression. The study uses data from Scopus, Scimagojr and the Hungarian Academy of Sciences for the five-year period 2019-2023. The results show that award-winning researchers predominantly publish in high-impact journals and actively participate in prestigious international conferences, contributing to their increased academic visibility. Significant differences exist between the publication practises of international award winners and Hungarian researchers, with the latter favouring local or low-impact publications. The paper provides recommendations for Hungarian researchers to improve their international visibility by adopting the successful publication strategies of award-winning scientists. It emphasises the importance of selecting prominent conferences and engaging in globally recognised research communities.

Keywords: computer science; publication practices; scientific awards; research visibility; research excellence

1 Introduction

Scientific awards often serve as “symbols” within academia. Recognised globally, international awards act as incentives and play a crucial role in assessing both individuals and institutional scientific achievements [1]. These awards can greatly influence the lives and career trajectories of recipients. For example, winning an

award can positively affect the behavior of the awardee, leading to increased productivity. Zhu et al. [2] demonstrated that researchers who received awards were more productive than their peers, received more citations, and generally had longer research careers, with these effects being especially pronounced among early and mid-career researchers. Furthermore, international prizes significantly contribute to the advancement of science and business through innovation [3, 4]. According to Zheng and Liu [1] and Jiang and Liu [5], such awards can also enhance the prestige of the individual institution and, when applicable, the country from which the award originates.

In addition to acknowledging exceptional achievements, awards are often linked to both financial and social benefits [6]. Brunt et al. [7] discovered that awards tend to carry more prestige than monetary rewards. Frey and Gallus [8, 9], who have conducted extensive research on prizes and awards, also concluded that these accolades serve as strategic resources and significantly enhance performance, not only in academia but also in nonprofit and for-profit sectors. Moreover, Ren et al. [10] found that prizes positively impact network growth, as award winners are increasingly integrated into a broader and more recognized research community.

Prizes and awards can be established by official scientific communities and institutions or by wealthy patrons, such as Alfred Nobel, who dedicate their legacies to science [11]. In higher education and academic circles, there are numerous prestigious prizes, ranging from the Nobel Prize, regarded as the pinnacle of academic achievement, to the Fields Medal, or other discipline-related awards [12]. However, the process of awarding these prizes and the criteria used are often contested or controversial [13], and many have highlighted the widespread negative effects associated with such awards. In this context, Lincoln et al. [14] and Gehmlich and Krause [15] note that female researchers are significantly underrepresented, both in the number of award recipients and in the composition of award juries. Lincoln et al. [14] specifically criticise "women's prizes" or women-only awards, arguing that they "ghettoise" the recognition and further exacerbate the gender gap in science. Lagisz et al. [13] suggest that addressing discrimination in science prizes requires a shift from unequal policies and practices to strategies that promote inclusion and diversity. Key measures include fair selection processes, actively encouraging nominations from underrepresented groups, promoting transparency and rigorous scientific standards, and institutionalising gender equality measures at national and European levels [16, 17].

In this article, we explore the role of awards within the field of computer science. The selection of computer science as the focus of our analysis is not fortuitous. Officially established and recognised by the academic community in 1962 with the founding of computer science departments at Purdue and Stanford Universities [18], it is one of the most dynamic and rapidly evolving scientific disciplines. With an unparalleled practical and societal impact, advances in computer science have the potential to influence all aspects of life [19]. The United States leads globally in

computer science, though the United Kingdom, China, Canada, and Germany are also significant contributors [20]. Moreover, computing exerts a profound influence on other scientific fields, and research in this area is highly interdisciplinary [21]. As such, computer science is crucial for the advancement of scientific research and the continued development of science [22].

Computer science stands out in terms of the publication and dissemination of scientific findings. Unlike most other disciplines, where journal articles and books are the primary modes of scholarly communication, the most significant contributions in computer science are often found in conference proceedings [23]. Meho's study [24] demonstrated that publishing in conference proceedings, particularly those of high repute, holds equal importance and influence as publishing in leading journals within the discipline. Fiala and Tutoky [25] highlight that the number of conference papers and publications has increased over the years, with certain areas, such as artificial intelligence research, experiencing a significant surge in conference papers. This trend has been corroborated by studies conducted in China and Canada. This is a noteworthy observation, given that conference papers generally receive fewer citations than journal articles [26, 27].

2 Literature Review

The field of computer science is also remarkable in terms of recognition and remuneration. Although there is no Nobel Prize specifically for this discipline, many regard the A. M. Turing Award, which honours outstanding technical achievements in computer science, as its equivalent [28]. This prestigious prize is awarded by the Association for Computing Machinery (ACM), with recipients also receiving financial recognition from Google. Cerf [29] highlighted that the Turing Award has significantly elevated the global profile of computer science and serves as a crucial platform for acknowledging researchers and innovators whose contributions have made a substantial impact on the world. The award is highly competitive; according to a study by Jin et al. [28], recipients typically have a higher h-index and citation rate each year compared to their peers, reflecting the rigorous standards required to win the Turing Award. In addition to the Turing Award, there are other notable prizes in the field of computer science. These include the Ackermann Award, which recognises achievements in the logic-related aspects of the discipline [30]; the Maurice Wilkes Award, which honours valuable research contributions in computer science [31]; and the IACIS Conference Awards, which celebrate educational breakthroughs and top institutions in the field of computer science [32].

Continuing our exploration, we focus our research on Hungary from a regional perspective. Despite its relatively small size, Hungary has been at the forefront of computing developments, particularly in the areas of computational intelligence and

informatics, since the early 20th century [33]. The country has consistently demonstrated a strong commitment to technological advancements and research in computer science, participating in numerous technology-focused studies and projects [34, 33]. Computer science education in Hungary has a long and distinguished history, with early initiatives led by László Kalmár, a key innovator, educator, and researcher who is considered the founding figure of Hungarian computer science [35]. Somogyvári et al. [36] note that the Hungarian education system has played a crucial role in shaping the nation's computer science landscape. In the 1970s, computer education was introduced across various levels of schooling, from secondary schools to universities, with programmes encompassing cybernetics and computer clubs. Hungary has also been proactive in advancing computer science on the international stage. As Fiala and Willett [33] highlight, the country has organised numerous international symposiums and participated in research projects aimed at promoting computer science in Eastern Europe, particularly following the political and economic changes of the 1990s. While the Hungarian government actively supported the development of computer science research during the early 2000s [37], more recent studies reveal systemic issues and complex challenges within the field. Biró et al. [38] point out the sub-optimal skills and education of students, leading to a high dropout rate, while Kiss [39] highlights the negative impacts of disparities among institutions, resulting in mixed-quality research. Concluding the above, given Hungary's longstanding contributions to computer science – from pioneering educational initiatives to hosting influential international symposiums – the country provides a compelling case for research. It offers valuable insights into the development of computational intelligence and informatics within a unique regional context.

To gain deeper insights into research outcomes and to compare them with the performance of international awardees, we analysed the scientific achievements of Hungarian researchers in the field of chemistry by categorizing them based on their academic status. Our analysis included all researchers working in chemistry, with a particular focus on those affiliated with the Hungarian Academy of Sciences (HAS), specifically academics and Ph.D. holders. For a more detailed examination, it is important to briefly outline the unique structure of the Hungarian academic degree system, as described by Sasvári and Nemeslaki [40]. This system is structured into three distinct stages (from 1 (low) to 3 (high)):

1)	Ph.D. degree	The Ph.D. degree represents the initial level in the Hungarian academic hierarchy. As in other European academic systems, this degree is conferred upon researchers who have successfully defended their doctoral thesis, typically through a doctoral school affiliated with a Hungarian higher education institution.
2)	D.Sc. degree/ Doctor of Science degree	A pinnacle of scientific achievement in Hungary, to qualify a D.Sc. degree, a researcher must first hold a Ph.D. (or its equivalent, the C.Sc. degree). This degree is awarded to those who have made outstanding scientific contributions

		recognized both domestically and internationally. The requirements for earning a D.Sc. vary by discipline, with each set by the HAS according to its specific classifications.
3)	HAS academician/HAS member	Researchers who achieve a D.Sc. degree may be considered for election to the Academy, beginning as corresponding members and potentially advancing to full membership (with no rank distinction between the two). However, there is a stringent limit on the number of individuals who can attain this level, as the HAS enforces a membership cap. According to 2024 regulations, the Academy can have no more than 365 members, and the number of new academics elected each year is strictly controlled.

In this study, the second and third categories, comprising D.Sc. degree holders and Academicians, are combined for analysis and will be referred to collectively as "HASAD."

We formulated the following research questions in the field of computer science to investigate the publication practices of the award winners:

- RQ1: What is the relationship between individual publishing activity and international recognition of publishers in the field of computer science?

- RQ2: What are the differences between the publication habits of international award winners and Hungarian computer scientists?

The discovery of the above queries is aimed at identifying patterns and recommending good practises for researchers in the field of computer science in Hungary.

3 Methodology

Our study was conducted using the Scopus and Scimagojr databases and data from the VI. Section of Engineering Sciences of the Hungarian Academy of Sciences. Our study covers a period of five years, from 2019 to 2023. For methodological reasons, it is important to mention that computer science appears in several scientific categories in Scopus, as follows:

-Artificial Intelligence (AI, in 2023 there will be 306 journals in the Scimagojr database): The Artificial Intelligence category deals with the development of machine learning, natural language processing and intelligent systems.

-Computational Theory and Mathematics (CTM, 167): This category covers the theoretical study of computer models, algorithms and mathematical foundations.

-Computer Graphics and Computer-Aided Design (CGCD, 99): The Computer Graphics and Computer-Aided Design category focuses on the development and application of computer graphics, 3D modelling, animation and design software.

-Computer Networks and Communications (CNC, 357): The Computer Networks and Communications category specialises in the development and optimisation of network architectures, communication protocols and data networks.

-Computer Science Applications (CSA, 773): The Applications of Computer Science category covers a variety of applications of computer science, including applications in industry, science and engineering.

-Computer Science (miscellaneous) (320): The Computer Science (Other) category covers computer science topics that cannot be clearly assigned to the other categories.

-Computer Vision and Pattern Recognition (CVPR, 95): The Computer Vision and Pattern Recognition category deals with image processing, object recognition and pattern recognition techniques.

-Hardware and Architecture (HA, 161): The Hardware and Architecture category is concerned with research into the design and development of computer hardware, microprocessors and system architectures.

-Human-Computer Interaction (H-CI, 134): The Human-computer Interaction category is concerned with the study of human-computer interaction and the development of user interfaces and usability testing.

-Information Systems (IS, 379): The Information Systems category is concerned with the design, implementation and management of information systems.

-Signal Processing (Signal, 105): The signal processing category covers various techniques and applications of signal processing, signal analysis and signal processing.

-Software (372): The software category includes research and development in the areas of software development, software quality and programming languages.

To analyse the publishers, we have selected the most important publishers in the field of computer science which mostly coincide with early research identifying the key sources [41]:

-Institute of Electrical and Electronics Engineers (IEEE): The EEE is an international professional organisation that brings together a community of electrical engineers, electronics engineers, computer scientists and related professionals. The IEEE was founded in 1963 and is now the world's largest technical professional organisation with more than 400 000 members.

-Springer-Verlag (Springer): Springer (officially Springer Science + Business Media) is an international publishing house specialising in books and journals in

the fields of science, technology and medicine. Springer is one of the most recognised publishers in the global scientific publishing market and significantly influences scientific communication worldwide. In 2015, Springer merged with Nature Publishing Group, Palgrave Macmillan and Macmillan Education to form Springer Nature, further strengthening the publisher's position in the scientific and educational publishing market.

-Association for Computing Machinery (ACM). ACM is the world's largest computing society, contributing to the development of computing technology through the organisation of conferences and the publication of scientific journals [42].

-Neural Information Processing Systems Foundation. A well-known organisation that publishes cutting-edge research in the field of neural networks and machine learning. Its best-known event is the annual Neural Information Processing Systems (NeurIPS) conference, presenting the latest advances in artificial intelligence, machine learning and computer science.

-ML Research Press. ML (Machine Learning) Research Press is a specialised publisher of research and results in the field of machine learning and artificial intelligence.

In this study we have also analysed other publishers, in particular to examine the Hungarian and wider international context:

-Akadémiai Kiadó: Akadémiai Kiadó is one of the oldest and most important academic publishers in Hungary, founded in 1950. The main objective of the publishing house is the dissemination of scientific knowledge and the promotion of scientific publications in Hungarian, but it also publishes internationally renowned scientific publications.

-The Budapest University of Technology and Economics (BME) is published by BME University Publishing House. This publishing house is the official university publishing house of the Budapest University of Technology and Economics (BME) and aims to support the teaching and research activities of BME and to publish scientific and professional material produced at the university.

-Elsevier, a global information and analytics company in the fields of science, technology and medicine and one of the largest and best-known scientific publishers in the world.

-Multidisciplinary Digital Publishing Institute (MDPI): MDPI is a Swiss-based open access science publishing house founded in 1996. One of MDPI's main goals is to provide open access to scientific research so that researchers' findings can be made available to the global community free of charge. MDPI covers a wide range of scientific disciplines, including natural sciences, engineering, medicine, social sciences and humanities.

To explore the performance of Hungarian researchers, we analysed the members of the VI. Section of Engineering Sciences of the Hungarian Academy of Sciences, which is composed of multiple scientific committees and whose researchers are active in various technical and engineering fields. (Table 1)

Table 1
Contains the result of comparing in pairs with the final result

Number	Name	Committees involved in the investigation
1	Committee on Materials Science and Technology	
2	Committee on Hydrodynamics and Thermal Energy Engineering	
3	Committee on Automation and Computer Science (AaCS)	X
4	Committee on Electronic Devices and Technologies (EDaT)	X
5	Committee on Electrical Engineering (EE)	X
6	Committee on Energetics	
7	Committee on Architecture	
8	Committee on Mechanical Structures	
9	Committee on Information Science (INS)	X
10	Committee on Transport Engineering	
11	Committee on Metallurgy	
12	Committee on Fibre Technology	
13	Committee of Solid Bodies	
14	Committee on Telecommunication Systems (TS)	X
15	Committee on Water Management	

Source: based on the website of Section VI of the Hungarian Academy of Sciences

We also considered the Topic Prominence Percentile (TPP) indicator to analyse the trends. The TPP is an indicator of the degree to which a particular research topic is prominent or visible in the scientific community. The percentage value shows where a particular topic stands in a ranking compared to other topics. A higher percentage value means that the topic receives more attention and is more recognised in the research community [43].

4 Results

Figure 1 illustrates the proportion of conference publications by discipline in 2023. Decision sciences (60%) and computer science (51%) stand out with particularly high proportions of conference publications compared to other disciplines. Following these, mathematics (41%), energy (34%), physics and astronomy (28%), and earth and planetary sciences (21%) occupy the middle range. The overall

average conference publication rate is 13%, with most disciplines falling below this mark. Decision sciences and computer science are notably well-represented in both conference attendance and publications. These findings align with and support the thesis previously discussed in the literature. (Figure 1)

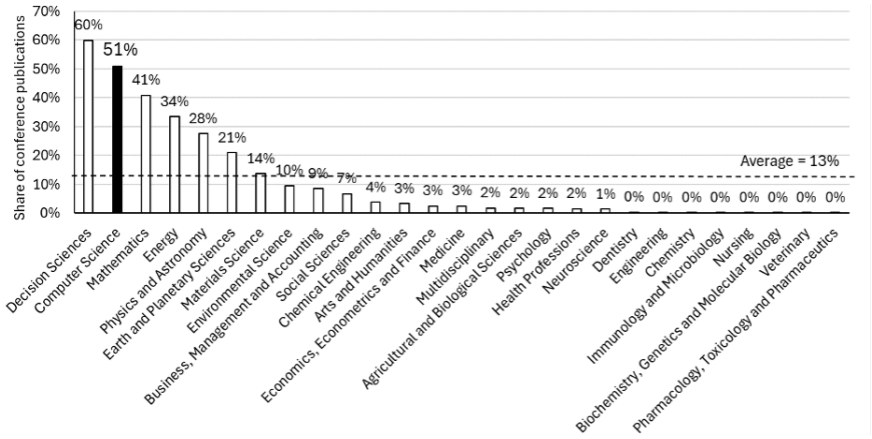


Figure 1
Share of conference publications by discipline in 2023 (4.14 million in total, 0.69 million for computer science)

Source: based on Scopus data

In the field of computer science, we analysed the number and proportion of publications between 2019 and 2023 for the Scopus categories of three sectors: award winners, the HASAD, and other researchers (non-HASAD) in Hungary. A total of 10144 publications were published in Hungary, 41% of which were in the field of Computer Science Applications, 24% in the field of artificial intelligence and 21% in the field of computer networks and communication. The three most important scientific categories of the award winners' publications are Software (35%), Artificial Intelligence (25%) and, in a tie, Computer Networks and Communication (19%) and Computer Science Applications (19%). 1826 publications were produced by the HASAD 1030 of which (56.52%) were in the field of computer science. In this case, the outstanding scientific category also includes Computer Science Applications (28%) and Computer Networks and Communication (26%) as well as Artificial Intelligence (24%). A detailed analysis of the publications of the HASAD committees in the field of computer science shows that 425 were published in TS, 343 in INS, 288 in AaCS, 55 in EDaT and 50 in EE.

A chi-square test of independence confirmed that the distribution of publications across categories differed significantly among the three researcher groups, $\chi^2(22, N = 12\ 627) = 744.91$, $p < 0.001$, Cramér's V = 0.13. Standardized residuals indicated that award winners published disproportionately more in Software, Signal

Processing, and Computational Theory and Mathematics, while HASAD researchers were relatively overrepresented in Computer Networks and Communications and Signal Processing. In contrast, Hungarian researchers as a whole concentrated strongly in Computer Science Applications and Computer Science (miscellaneous), but were underrepresented in theoretical and software-intensive areas. (Table 2)

Table 2

Relationship between researcher segments and scientific categories based on publications between 2019 and 2023

Category	Pub. number	Of which computing-technology	AI	CTM	CGCD	CNC	CSA	Misc.	CVPR	HA	H-CI	IS	Sign	Soft
I. Recipients	1968	1451	25%	8%	3%	19%	19%	2%	12%	10%	6%	17%	13%	35%
II. HASAD	1826	1032	24%	4%	2%	26%	28%	4%	8%	11%	6%	12%	14%	16%
AaCS	542	288	24%	2%	4%	16%	34%	3%	6%	8%	3%	16%	17%	15%
EDaT	285	55	25%	2%	0%	11%	27%	0%	9%	25%	4%	13%	15%	7%
EE	141	50	16%	20%	0%	46%	42%	2%	4%	10%	4%	14%	18%	14%
INS	497	343	23%	5%	2%	18%	27%	3%	17%	5%	9%	9%	20%	18%
TS	537	425	21%	3%	0%	35%	21%	6%	3%	14%	4%	11%	9%	14%
III. Hungary	10144	10144	24%	5%	1%	21%	41%	9%	7%	11%	6%	18%	7%	15%

Source: based on Scopus data

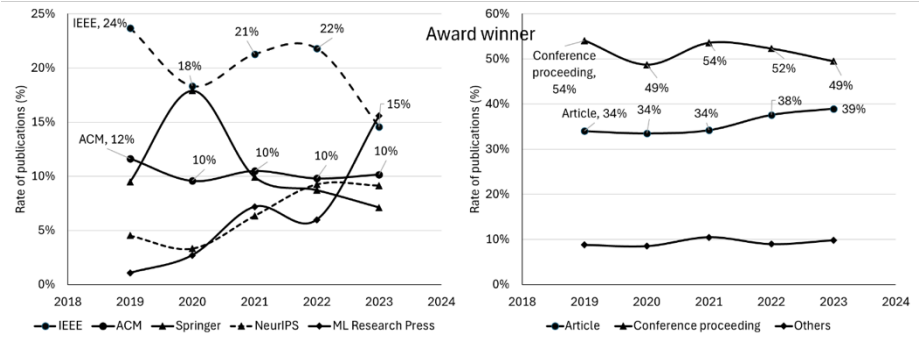
We also analysed the five most important publishers and publication formats for award winners, HASAD researchers, and other non-HASAD researchers in Hungary between 2019 and 2023. Among award winners, conference publications comprised between 49% and 54% of their output, while articles accounted for 34% to 39% during the same period. Notably, the share of articles published at IEEE was 24% in 2018, but this figure showed a fluctuating decline, reaching 15% by 2023. For ACM publishers, the share of articles published by awardees was 12% five years ago and has remained stable at 10% since 2020. At Springer, the share of publications rose by 8% between 2019 and 2020 before dropping below 10%. At NeurIPS, the proportion of award-winning articles steadily increased, reaching 10% in 2023. Additionally, ML Research Press saw its share rise by almost 10% between 2020 and 2023.

Regarding HASAD, the share of conference papers was 39% in 2019, peaked at 57% in 2021, and then declined to 49% in 2023. The share of articles was 43% in 2019, dropped to 35% in 2020, and rose again to 37% in 2023. Interest in conference

contributions has also notably increased among award winners. IEEE dominated in terms of publication rates for HASAD researchers, with a share between 29% and 35% and a steadily increasing trend from 2020 onward. Springer's share was 23% in 2019 but dropped to 10% in 2021, followed by a slight recovery to 15% in 2022 and 14% in 2023. Elsevier's share remained between 10% and 15%. Meanwhile, MDPI's share rose significantly from 5% in 2019 to nearly 14% in 2021, reflecting growing demand for this publisher.

For other researchers in Hungary, 2020 marked a turning point, as the share of articles consistently surpassed that of conference papers. The proportion of articles rose from 46% in 2019 to 58% in 2021, followed by a decline to 51% in 2023. The share of conference papers decreased from 45% in 2019 to 34% in 2021, before rebounding to 39% in both 2022 and 2023. Among publishers, MDPI saw a dramatic increase in interest, with its share rising from 9% in 2019 to 27% in 2021, briefly surpassing IEEE, whose share dropped from 35% in 2019 to 23% in 2021. However, IEEE regained its position, with shares rising to 30% in 2022 and 31% in 2023, overtaking MDPI once again. Springer remains the third most popular publisher in this field in Hungary, though its share declined from 16% to 12% over the last five years. Elsevier and Akadémiai Kiadó have seen stagnation in their shares.

A chi-square test of independence was also performed on all publications to confirm that these publisher patterns differ significantly across the three researcher groups. The results were $\chi^2(20, N = 13\ 421) = 193\ 881$, $p < 0.001$, Cramér's V = 0.61, all pointing to a large effect size. These results also statistically validate the descriptive trends shown in Figure 2 and shows that award-winning researchers are systematically more likely to publish through high-impact international venues, whereas Hungarian researchers, particularly non-HASAD scholars, tend to rely more on open-access and regionally oriented publishers such as MDPI or Akadémiai Kiadó. (Figure 2)



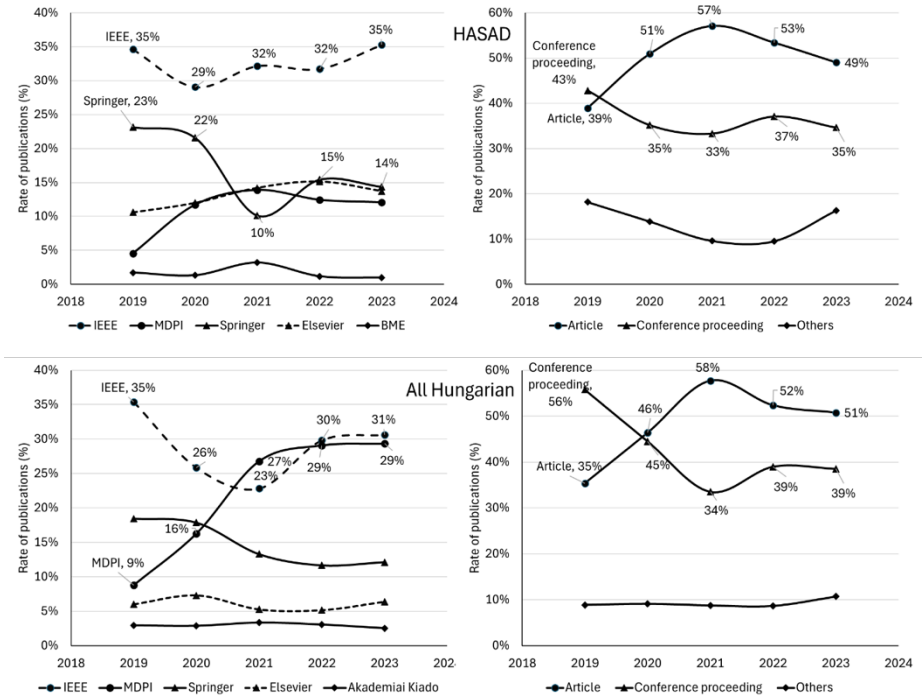


Figure 2

The five most popular publishers and forms of publication for award winners, HASAD, and Hungarian researchers in the field of computer science in Hungary between 2019 and 2023

Source: based on Scopus data

We then examined the four most popular and enduring publishers associated with academic committees in 2023. For each committee, IEEE accounts for the largest share of publications. In the Committee on Telecommunication Sciences, IEEE's share is particularly high, reaching 49%, while the Committee on Information Science also shows a significant share at 36%.

In contrast, Springer's share varies more widely. It is as low as 3% in the Committee on Electrical Engineering and 8% in the Committee on Information Science (INS), but it rises to 22% in the Committee on Automation and Computer Science.

Elsevier's share similarly fluctuates, ranging between 13% and 22%, with its lowest representation in the Committee on Telecommunication Systems (TS) at just 2%. MDPI also maintains a notable presence, with its share ranging from 11% to 17% across the various committees. (Figure 3)

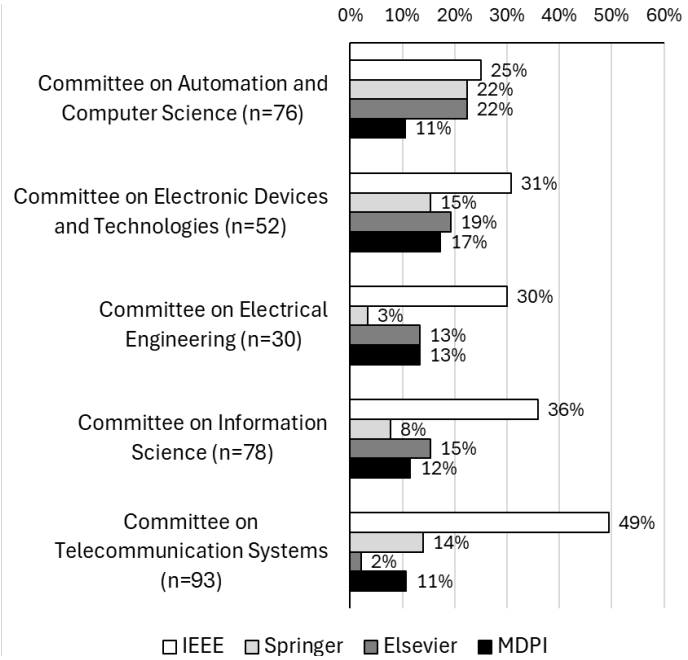


Figure 3
The 4 most popular and enduring publishers per involved HASAD committee in computer science in 2023

Source: based on Scopus data

In terms of TPP, we first examined the publication rate of international awardees on less popular topics (0-50 and 50-70) is significantly lower than the publication rate of HASAD and the overall Hungarian publication rate for the year 2023. The rates for moderately popular topics (70-90) are similar, suggesting that there is no difference in the publication habits of researchers in this case. The most critical finding in this regard concerns the most popular topics (98-100), a thematic region which is dominated by award winners (27%) while the HASAD are significantly lacking behind (13%). (Figure 4)

To ensure that these patterns reflect consistent differences rather than yearly fluctuations, we conducted inferential statistical tests on the aggregated 2019-2023 dataset. The Kruskal-Wallis test confirmed significant overall differences in topic prominence across the three researcher groups ($p < 0.001$, $\varepsilon^2 \approx 0.05$). Dunn's post-hoc comparisons revealed that award-winning researchers publish in significantly higher-prominence topics than both HASAD ($Z = 8.29$, $p < 0.001$) and Hungarian researchers ($Z = 5.34$, $p < 0.001$), while HASAD members focus on somewhat less prominent topics than the broader Hungarian sample ($Z = -5.60$, $p < 0.001$). A complementary chi-square test on binned TPP categories (0-50%, 50-70%, 70-90%, 90-98%, 98-100%) also indicated a statistically significant association

between researcher group and topic prominence, $\chi^2(8, N = 13\,421) = 663$, $p < 0.001$, Cramér's V = 0.16. These results corroborate the descriptive patterns shown in Figure 4 and present that internationally award-winning computer scientists consistently and visibly engage with higher-visibility and higher-impact research topics than their Hungarian counterparts.

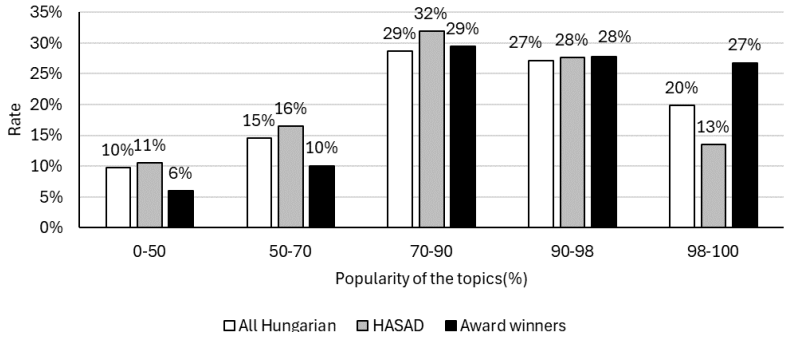


Figure 4
Popularity of topics in the field of computer science in 2023

Source: based on Scopus data

5 Discussion

1) Relationship between individual publishing performance and international recognition in view of publisher choices (RQ1)

Our research underscores the close relationship between individual publication activity and international recognition in the field of computer science. Award-winning researchers are not only prolific but also strategic in their choice of publication venues, opting for high-impact journals and prestigious conference proceedings that maximise visibility and citation potential. This trend is particularly evident in their preference for publishers such as IEEE, Springer, and ACM, which are renowned globally for their rigorous peer-review processes and their role in disseminating groundbreaking research.

The choice of these platforms is more than a matter of prestige; it reflects a deep understanding of the academic environment. These publishers provide access to a broad international audience, which is crucial for researchers aiming to influence the direction of their field. By publishing with these leading publishers, award-winning researchers ensure that their work reaches the most relevant and influential audience. This strategic approach to publication not only enhances the researchers' academic visibility but also solidifies their position within the global scientific community.

Importantly, the inferential statistical analyses introduced in the revised version (including χ^2 tests, Kruskal-Wallis tests, and Dunn post hoc comparisons) confirm that these patterns are statistically significant rather than merely descriptive. Award-winning researchers consistently publish in higher-visibility venues and on higher-prominence topics, demonstrating a systematic link between strategic publisher choice and international recognition.

Conferences play a particularly significant role in this strategy. Events organised by IEEE and ACM serve as important venues for the presentation of research results, while also acting as hubs for networking, collaboration, and the cross-border exchange of ideas. This dual function of conferences as both dissemination and networking platforms further enhances the international recognition of researchers who participate actively in these events.

2) Differences between the publication habits of international award winners and Hungarian researchers (RQ2)

The analysis reveals considerable differences in the publication practices between international award winners and Hungarian computer scientists. International award winners tend to publish in journals and conference proceedings with the highest impact factors, such as those from IEEE, Springer, and NeurIPS. In contrast, Hungarian researchers often publish in more locally or regionally recognised journals like Acta Polytechnica Hungarica and Infocommunications Journal. While these journals are respected within the region, they lack the global visibility and impact factor necessary to reach a wider international audience.

This discrepancy has significant implications for the international recognition of Hungarian researchers. By favouring local publications, Hungarian researchers may limit the international citation and influence of their work. Moreover, the focus on less popular or niche topics further exacerbates this issue, as it restricts the potential audience and citation pool. In comparison, international award winners strategically focus on more popular and emerging topics, aligning their research with global trends, which increases their visibility and impact.

The inferential statistical results presented in the revised manuscript (χ^2 tests on publication categories and TPP distributions, as well as the Kruskal-Wallis and Dunn post hoc analyses) provide strong evidence that these differences are statistically significant. Hungarian researchers – both the HASAD group and the broader non-HASAD population – are systematically underrepresented in high-prominence topics (TPP 98-100) and over-represented in mid- and low-visibility areas. This confirms that the gap in publication patterns is structural rather than incidental, and is closely linked to the much lower international visibility of Hungarian researchers.

3) Suggestions for local researchers and broader implications

To bridge the above gap, Hungarian researchers should consider adapting their publication strategies to align more closely with those of international award

winners. This includes targeting high-impact, globally recognised journals and increasing participation in prestigious conferences such as those organised by IEEE and ACM. Additionally, engaging in international collaborations can enhance visibility and citation rates, especially when working with award-winning research groups.

It is also important for Hungarian researchers to focus on emerging and popular research areas within computer science, such as artificial intelligence, machine learning, and network systems. Publishing on topics that are more widely recognised and valued by the international community can significantly increase the visibility and impact of their work. Moreover, the adoption of open-access platforms like MDPI, which offer relatively fast publication speeds, could also help increase the dissemination of their research.

The findings from this study contribute to a broader understanding of the factors that influence academic visibility and recognition in the field of computer science. They highlight the importance of strategic publication practices in achieving international recognition and suggest that aligning local practices with global standards can enhance the impact of researchers in smaller or less visible academic communities.

In addition, our results are consistent with earlier publications on computer science dissemination practices (e.g., studies reporting the central role of top-tier conferences and global publishers), reinforcing the relevance of adapting Hungarian publication strategies to internationally successful patterns. This alignment between our findings and previous literature strengthens the broader implications of the study and confirms that visibility is closely linked to competitive venue selection and engagement with high-profile topics.

Future research could explore these dynamics in other regions or disciplines, as well as examine the long-term effects of adopting these recommended practices on the career trajectories of researchers. Additionally, further studies could investigate the impact of digital and open-access publishing platforms on the visibility and citation rates of researchers from different regions. Such research could help determine whether changes in publication strategies result in measurable increases in international visibility and whether institutional policies can effectively support these transitions.

Conclusions

One can confidently assert that computer science increasingly forms the backbone of scientific discovery, highlighting the critical importance of not only publishing prolifically but also ensuring the highest quality of research output. In this study, we analysed the publication habits of award-winning researchers in cutting-edge computer science and compared them to those of their Hungarian colleagues in the discipline. The primary goal of this article is to assist computer science researchers

in refining their publication strategies, thereby enhancing the visibility of their work and facilitating their integration into the international scientific community.

By following the examples provided in this study, researchers can significantly influence the advancement of their discipline and foster innovation, all while strategically planning their own career paths. Embracing the identified trends and strategies and adopting the best publication practices of international award winners, can help Hungarian researchers achieve wider dissemination of their work.

Our findings are consistent with earlier research on publication practices in computer science, which highlights the central role of top-tier conferences, high-impact publishers, and engagement with globally prominent research topics. This alignment with previous work reinforces the broader relevance of our results and suggests that the challenges observed in the Hungarian context reflect wider structural patterns in the discipline.

In addition, the statistical evidence obtained in this study provides a solid foundation for future research. Subsequent studies could examine how changes in publication strategy affect long-term career trajectories, whether institutional incentives support internationally competitive publishing, and how emerging digital and open-access platforms reshape visibility in smaller research communities. Exploring these directions may help develop more effective policies to strengthen the global presence of researchers working in less visible scientific environments.

We hope that this article will serve as a valuable guide for developing best practices in publication within the field of computer science.

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References

[1] Zheng, J., Liu, N. Mapping of important international academic awards", Scientometrics, 104 (3), pp. 763-791, 2015, doi: 10.1007/s11192-015-1613-7

[2] Zhu, W., Jin, C., Ma, Y., Xu, C. Earlier recognition of scientific excellence enhances future achievements and promotes persistence, Journal of Informetrics, 17 (2), 101408, 2023, doi: 10.1016/j.joi.2023.101408

[3] Borjas, G., Doran, K. Prizes and Productivity: How Winning the Fields Medal Affects Scientific Output, National Bureau of Economic Research, Cambridge, MA, w19445, 2013, doi: 10.3386/w19445

[4] Moser, P., Nicholas, T. Prizes, Publicity and Patents: Non-Monetary Awards as a Mechanism to Encourage Innovation, The J Industrial Economics, 61 (3) pp. 763-788, 2013, doi: 10.1111/joie.12030

[5] Jiang, F., Liu, N. The hierarchical status of international academic awards in social sciences, Scientometrics, Vol. 117 (3), pp. 2091-2115, 2018, doi: 10.1007/s11192-018-2928-y

[6] Frey, B. S., Neckermann, S. Awards as signals, CESifo Working Paper, 3229, pp. 1-24, Center for Economic Studies and ifo Institute (CESifo), Munich, 2010

[7] Brunt, L., Lerner, J., Nicholas, T. Inducement Prizes and Innovation, The J Industrial Economics, 60 (4), pp. 657-696, 2012, doi: 10.1111/joie.12002

[8] Frey, B. S., Gallus, J. Towards an Economics of Awards, Journal of Economic Surveys, 31 (1), pp. 190-200, 2017, doi: 10.1111/joes.12127

[9] Frey, B. S. Gallus, J. Honours versus Money, 1. Oxford University Press, 2017, doi: 10.1093/oso/9780198798507.001.0001

[10] Ren, J., Shi, Y., Shatte, A., Kong, X., Xia, F. The significance and impact of winning an academic award: a study of early career academics, in Proceedings of the 22nd ACM/IEEE Joint Conference on Digital Libraries, Cologne Germany: ACM, 2022, pp. 1-11, doi: 10.1145/3529372.3530913

[11] Hansson, N., Halling, T., Fangerau, H. Attributing Excellence in Medicine: The history of the Nobel Prize. in Clio medica, No. 98, Leiden Boston: Brill, 2019

[12] Frey, B. S. Awards in the digital world, Int Rev Econ, 66 (1), pp. 29-36, 2019, doi: 10.1007/s12232-018-0291-1

[13] Lagisz, M., Rutkowska, J., Aich, U., Ross, R. M., Santana, M. S., Wang, J., Trubanová, N., Page, M. J., Pua, A. A. Y., Yang, Y., Amin, B., Martinig, A. R., Barnett, A., Surendran, A., Zhang, J., Borg, D. N., Elisee, J., Wrightson, J. G., Nakagawa, S. Best Paper awards lack transparency, inclusivity, and support for Open Science, 2024, doi: 10.1101/2023.12.11.571170

[14] Lincoln, A. E., Pincus, S. Koster, J. B., Leboy, P. S. The Matilda Effect in science: Awards and prizes in the US, 1990s and 2000s, Soc Stud Sci, 42 (2) pp. 307-320, 2012, doi: 10.1177/0306312711435830

[15] Gehmlich, K., Krause, S. Gender Distribution of Scientific Prizes Is Associated with Naming of Awards after Men, Women or Neutral, Data, 9 (7) p. 84, 2024, doi: 10.3390/data9070084

[16] Holmes, M. A., Asher, P., Farrington, J., Fine, R., Leinen, M. S., LeBoy, P. Does gender bias influence awards given by societies?, EoS Transactions, 92 (47) pp. 421-422, 2011, doi: 10.1029/2011EO470002

[17] Sánchez, A., Samper-Gras, T., Jabbaz, M., Díaz, C. An open path for gender equality in research: When women scientists question the state of science and the institutions embrace the criticism, Metode SSJ, pp. 97-103, 2016, doi: 10.7203/metode.7.8187

[18] Denning, P. J. The science in computer science, Commun. ACM, 56 (5), pp. 35-38, 2013, doi: 10.1145/2447976.2447988

[19] Sojat Z., Skala, K. The Rainbow: Integrating Computing into the Global Ecosystem, in 2019 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), Opatija, Croatia: IEEE, 2019, pp. 222-229, doi: 10.23919/MIPRO.2019.8756947

[20] Zurita, G., Merigó, J. M., Lobos-Ossandón, V., Mulet-Forteza, C. Leading countries in computer science: A bibliometric overview, IFS, 40 (2), pp. 1957-1970, 2021, doi: 10.3233/JIFS-189199

[21] Caristi, J., Barr, V., Sloan, J., Stahlberg, E. Starting a computational science program", in Proceedings of the 42nd ACM technical symposium on Computer science education, Dallas TX USA: ACM, 2011, pp. 3-4, doi: 10.1145/1953163.1953167

[22] Prabhu, P., Jablin, T. B., Raman, A., Zhang, Y., Huang, J., Kim, H., Johnson, N. P., Liu, F., Ghosh, S., Beard, S., Oh, T., Zoufaly, M., Walker, D., August, D. I. A survey of the practice of computational science, in State of the Practice Reports, Seattle Washington: ACM, 2011, pp. 1-12, doi: 10.1145/2063348.2063374

[23] Franceschet, M. The role of conference publications in CS, Commun. ACM, 53 (12), pp. 129-132, 2010, doi: 10.1145/1859204.1859234

[24] Meho, L. I. Using Scopus's CiteScore for assessing the quality of computer science conferences, Journal of Informetrics, 13 (1), pp. 419-433, 2019, doi: 10.1016/j.joi.2019.02.006

[25] Fiala, D., Tutoky, G. Computer Science Papers in Web of Science: A Bibliometric Analysis", Publications, 5 (4), p. 23, 2017, doi: 10.3390/publications5040023

[26] He, Y., Guan, J. Contribution of Chinese publications in computer science: A case study on LNCS, Scientometrics, 75 (3), pp. 519-534, 2008, doi: 10.1007/s11192-007-1781-1

[27] Zhang, L. Studying the Publication Pattern of Canadian Computer Scientists / Étude des pratiques de publication des scientifiques canadiens en informatique, Canadian Journal of Information and Library Science, Vol. 39, No. 1, pp. 60-78, 2015, doi: 10.1353/ils.2015.0002

[28] Jin, Y., Yuan, S., Shao, Z., Hall, W., Tang, J. Turing Award elites revisited: patterns of productivity, collaboration, authorship and impact,

Scientometrics, 126 (3), pp. 2329-2348, 2021, doi: 10.1007/s11192-020-03860-4

[29] Cerf, V. G. ACM's FY14 annual report, Commun. ACM, 58 (1), pp. 11-15, 2015, doi: 10.1145/2691599

[30] Coquand, T., Dawar, A. The Ackermann Award 2016, LIPIcs, 62, CSL 2016, 62, p. 1:1-1:4, 2016, doi: 10.4230/LIPICS.CSL.2016.1

[31] Keckler, S. W. 2014 International symposium on computer architecture influential paper award, IEEE Micro, 34, pp. 95-96, 2014, doi: 10.1109/MM.2014.91

[32] Cornwell, L. Lacis 2004 conference in review. Journal of Computer Information Systems, 45 (2), pp. 105-107, 2004

[33] Fiala, D. Willett, P. Computer science in Eastern Europe 1989-2014: A bibliometric study, Aslib Journal of Information Management, 67 (5), pp. 526-541, 2015, doi: 10.1108/AJIM-02-2015-0027

[34] Detrekoi, A. Information society technology perspectives. Geodezia es Kartografia, 62 (5), pp. 3-6, 2010

[35] Szabó, M. László Kalmár and the First University-Level Programming and Computer Science Training in Hungary, in Histories of Computing in Eastern Europe, Vol. 549, C. Leslie and M. Schmitt, Eds., in IFIP Advances in Information and Communication Technology, Vol. 549, Cham: Springer International Publishing, 2019, pp. 40-68, doi: 10.1007/978-3-030-29160-0_3

[36] Somogyvári, L. Szabó, M. Képes, G. How Computers Entered the Classroom in Hungary: A Long Journey from the Late 1950s into the 1980s, in How Computers Entered the Classroom, 1960-2000, C. Flury and M. Geiss, Eds., De Gruyter, 2023, pp. 39-74, doi: 10.1515/9783110780147-003

[37] Kroó, N. Challenges for a new Europe, Phys. World, 17 (5), pp. 18-18, 2004, doi: 10.1088/2058-7058/17/5/24.

[38] Biró, P. Csenoch, M. Abari, K. Máth, J. First Year Students' Algorithmic Skills in Tertiary Computer Science Education, in Knowledge, Information and Creativity Support Systems, Limassol, Cyprus, 416, pp. 351-358, 2014, doi: 10.1007/978-3-319-27478-2_24

[39] Kiss, G. Measuring student's computer science knowledge at the end of the primary stage in Hungary, in 2011 IEEE 9th International Symposium on Applied Machine Intelligence and Informatics (SAMI), Smolenice, Slovakia: IEEE, 2011, pp. 19-22, doi: 10.1109/SAMI.2011.5738880

[40] Sasvári, P. Nemeslaki, A. The cruelty of data about scientific publication performance: An assessment of the visibility of Hungarian social science by

analyzing Hungary's main repository, CJSSP, 10 (2), pp. 125-146, 2019, doi: 10.14267/CJSSP.2019.2.7

[41] Irwin, R. D. Characteristics of Frequently Selected Free Web Resources in Computer Science: An Exploratory Study of Academic Libraries, Science & Technology Libraries, 23 (1), pp. 71-85, 2002, doi: 10.1300/J122v23n01_06

[42] Buzydlowski, J. W. Cassel, L. N. Visualizing the Evolution of Information Retrieval via the ACM Computer Classification Codes, in 2021 ACM/IEEE Joint Conference on Digital Libraries (JCDL), Champaign, IL, USA: IEEE, 2021, pp. 336-337, doi: 10.1109/JCDL52503.2021.00059

[43] Zanotto E. D., Carvalho, V. Article age- and field-normalized tools to evaluate scientific impact and momentum, Scientometrics, Vol. 126, No. 4, pp. 2865-2883, 2021, doi: 10.1007/s11192-021-03877-3