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TRACING VISIBLE SCIENTISTS' ENGAGEMENT WITH THE ROMANIAN SOCIETY

Investigarea implicării oamenilor de ştiinţă cu vizibilitate în societatea românească

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TRACING VISIBLE SCIENTISTS' ENGAGEMENT WITH THE ROMANIAN SOCIETY

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Abstract
This article traces the figure of the visible scientists across Romanian history and examines how such figures have shaped, and been shaped by, shifting relationships among science, society, and education. Drawing on historical analysis, science communication literature, and pedagogical theory, the paper first situates visible scientists in global contexts, then focuses on Romania's distinctive trajectory from the twentieth century to the present. It shows how Communist era propaganda instrumentalised science to legitimise ideology, fostering both public fascination and deep seated mistrust that still colours attitudes toward STEM careers. Post 1989 reforms, while dismantling overt ideological control, largely retained top down, lecture centred pedagogies that discourage dialogic learning and public engagement. Case sketches of pre and postCommunist Romanian exemplars (e.g., Grigore Moisil, Solomon Marcus, Magda Stavinschi, Cristian Presură) illustrate the catalytic role they can play in inspiring youth and normalising the two way science–society interaction. Synthesising these insights, the paper argues that increasing the visibility and engagement of early career researchers can shift social norms, stimulate STEM enrolment, enlarge the pipeline of qualified teachers, and strengthen democratic deliberation on science linked issues.

Keywords: communist propaganda science, science communication, STEM education, visible scientists.

Rezumat
Acest articol urmăreşte evoluţia „oamenilor de ştiinţă vizibili" de-a lungul istoriei României şi analizează modul în care aceste figuri au modelat şi au fost modelate

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de relaţiile în schimbare dintre ştiinţă, societate şi educaţie. Bazându-se pe analiză istorică, literatură de specialitate în comunicarea ştiinţei şi teorii pedagogice, lucrarea identifică oamenii de ştiinţă vizibili în contexte globale, pentru ca ulterior să se concentreze pe traiectoria particulară a României din secolul al douăzecilea până în prezent. Articolul urmăreşte cum propaganda din perioada comunistă a instrumentalizat ştiinţa pentru a legitima ideologia, generând o neîncredere care încă influenţează atitudinile faţă de carierele STEM. Reformele de după 1989, deşi au demontat controlul ideologic explicit, au păstrat în mare măsură pedagogiile centrate pe prelegere, care descurajează învăţarea dialogică şi implicarea publică. Schiţele de caz ale unor exemple româneşti pre- şi postcomuniste (de exemplu, Grigore Moisil, Solomon Marcus, Magda Stavinschi, Cristian Presură) ilustrează rolul catalitic pe care oamenii de ştiinţă vizibili îl pot juca în inspirarea tinerilor şi în normalizarea interacţiunii bidirecţionale dintre ştiinţă şi societate. Integrând aceste perspective, lucrarea susţine că sporirea vizibilităţii şi a implicării cercetătorilor aflaţi la început de carieră poate schimba normele sociale, poate stimula interesul tinerilor pentru domeniile STEM, poate lărgi baza de profesori calificaţi şi poate consolida deliberarea democratică pe teme legate de ştiinţă.

***Cuvinte-cheie**: comunicarea ştiinţei, educaţie STEM, oameni de ştiinţă vizibili, ştiinţa în slujba propagandei comuniste.*

1. Introduction

The interplay between science, education, and society has long been understood as a critical factor in shaping public attitudes toward science and scientific careers. Educational practices, often subtly influenced by historical narratives, social ideologies, and political contexts, significantly impact students' engagement, interest, and ultimately their decisions to pursue careers in Science, Technology, Engineering, and Mathematics (STEM) (Osborne et al., 2003). In Romania, understanding these dynamics necessitates an examination of how science has historically been communicated, perceived, and taught, particularly given the country's distinct experiences during the Communist era of politicization and even propaganda and neglect after its end (Birzea, 1996; Marin, 2018). Ontologically, science education is not merely the transmission of factual knowledge; it is fundamentally an act of meaning-making, shaped by historical norms, societal perceptions, and ideological contexts that determine how science is represented and understood within educational spaces (Driver et al., 1994; Zoller, 2012). From this standpoint, the historical trajectory of science communication in Romania, marked by periods of propagandistic manipulation, followed by neglect and passive formalism, presents profound implications for contemporary pedagogical practices and student identity training in relation to science (Aikenhead, 1996; Merolla & Serpe, 2013).

The Communist regime in Romania explicitly employed science as a tool for ideological reinforcement, framing scientific advancement as evidence of political superiority, often at the expense of authenticity and trust (Andrews, 2016). Following the fall of the regime in 1989, despite the ideological shift, the educational legacy of top-down, passive communication models persisted, arguably exacerbating students' disengagement with STEM disciplines (Dobbins, 2017; Kifor et al., 2021). Consequently, today's Romanian youth show a troublingly low interest in pursuing STEM careers, a situation with far-reaching implications for national innovation capacity, economic competitiveness, and societal development (Vlăsceanu et al., 2010).

Pedagogically, addressing this challenge requires more than curricular adjustments or isolated methodological improvements; it requires structural

change grounded in a historically informed understanding of how science is presented and experienced within educational contexts. The present paper employs an interdisciplinary approach, drawing on historical analysis, pedagogical theory, and science communication studies, to identify how one particular component of science in society, the "visible scientists", has influenced not only the way science is perceived in Romania, but also the interest in STEM careers in general. The goal is to explore how past practices have shaped present realities, and how visible scientists can be an element in a push to revitalize STEM education, motivate Romanian youth, and reshape societal perceptions toward science and scientific careers.

2. Methodology

This study uses a qualitative, multi-source design combining historical document analysis, targeted review of science-communication and pedagogy scholarship, and thematic analysis of interview materials.

First, we surveyed primary and secondary sources (archival press, memoirs/biographies, policy papers, statistical reports) to trace how scientists' public roles were framed in Romania from the late 19th century to the present, with special attention paid to the Communist era. Second, we conducted a purposive scan of the literature to identify the Romanian academic community's position in the debates about "visible scientists" and dialogic science communication. Third, we thematically analysed interview materials collected from two sources: senior researchers featured in journalistic interviews and long-form conversations that addressed public engagement (such as the YouTube series by Cristian Presură and the author (2022)), and early-career researchers and students interviewed in the context of a science communication course at the University of Bucharest. The analysed interviews covered the period 2018-2024 and included 13 senior researchers and eight early-career participants; quotations were anonymized or referenced as public materials accordingly.

The interviews were coded using an abductive approach (Tavory & Timmermans, 2022): beginning with a small set of sensitizing concepts from the literature, we conducted open coding, memoed surprising instances, and

iteratively refined the codebook to generate explanations that best fit the corpus. We actively searched for disconfirming cases and recoded earlier materials when new distinctions emerged. A preliminary codebook (e.g., visibility drivers, perceived career risks, pedagogical influences, communist legacies, public trust cues) was iteratively refined as patterns stabilized across sources. Triangulation of data, combining document analysis and interviews, aims to minimize bias and supports the interpretive claims made about norms, incentives, and exemplars. The objective of this endeavour is not to create a representative illustration of the Romanian science communication history, but to illuminate how the visibility and perception of scientists in the Romanian society have shaped and can reshape science-society relations.

3. Science and society: mapping the fault line

This section synthesizes international references to frame the analytical lens that we later used for Romania; it is based on a targeted literature review rather than original data. The historical relationship between science and the Romanian society parallels the relationship of the same society and education in many ways: both strive to disseminate knowledge, they revere those who possess it, and they rely heavily on discourse-based methods. Notably, both have also amassed data suggesting that such top-down, lecture-driven methods often fail to achieve their objectives. Although educational theory began shifting its emphasis toward the student-centred approaches over a century ago, mainly due to progressivism and constructivism in education, as espoused by Dewey (1933), Piaget (1973), Vygotsky (1962), science communication has only recently made a similar move: away from treating researchers and scientific content as central and toward focusing on meaningful public dialogue. This resulted from the analysis of the implementation of Bodmer Report findings in UK (Bodmer, 2010) where several years of science communication investment and support did not change the public attitudes toward scientific research. Such perspective is supported by several similar examples, as mentioned by proponents of the dialogue approach to science communication (Baram-Tsabari & Lewenstein, 2017; Lewenstein & Baram-Tsabari, 2022; Nisbet & Scheufele, 2009).

At the beginning of the last century, Dewey wrote that "the child becomes the sun about which the appliances of education revolve; he is the centre about which they are organised" (Dewey, 1956, p. 51), thus, laying the groundwork for student-centred learning in education. Science took a longer route toward a similar insight, that its communication should be public-centred (Baram-Tsabari & Lewenstein, 2017). Researchers have been communicating with various audiences throughout history, whether in Plato's Academy, through Arab geometrical decorations in the Middle Ages, or in Enlightenment-era public demonstrations. Researchers have depended on the public for everything from funding to moral support or simple admiration (Hannam, 2011).

However, the emergence of a recognised scientific community by the late 19th century and its professionalisation had an unforeseen outcome: it set scientists apart from the broader public, symbolically isolating them in the so-called ivory tower (Broks, 2006). This demarcation signalled the first widespread articulation of the superiority of scientific knowledge over lay knowledge and gave rise to the gap between scientists and the wider society. Many science and science communication historians locate the first systematic attempts to address a lay audience in the 1800 lectures at the Royal Institution (Royal-Institution, n.d.). Faraday's 1825 Christmas Lectures (Nerlich, 2018) are sometimes spotlighted as well, while others (Boissoneault, 2019) credit Bernard le Bovier de Fontenelle or Voltaire as the forefathers of modern science communication through their writings and essays.

From the outset, however, public science demonstrations have stirred both fascination and suspicion. Mary Shelley's Frankenstein (1818) vividly illustrated the dread accompanying early experiments with electricity. With enthusiasm for chemistry and explosions came Alfred Nobel and dynamite. With insights into the power of the atom came the bombing of Hiroshima and Nagasaki. The public perception of science and scientists has evolved from an enthusiastic hope for a better future to a sombre suspicion about irresponsibility and even maleficence. The dawn of the 20th century also revolutionised how we view science. Contradicting the late 19th-century conviction that nearly all major scientific discoveries had already been made (Peat, 2002), quantum theory, relativity and chaos theory introduced uncertainty, complexity and a new set of profound questions, like the new

forms proposed by scientist: fractals, attractors, etc. (Boutot, 1997). The discourse around science and scientists shifted, but for more than a century, the way scientists talked, wrote and thought about themselves did not.

The more recent history of science is contemporary with the appearance of the largest disruptions in mass communication: radio, television and the internet. Mass media spread information faster and broader, but it also created celebrities in unexpected places. Einstein was a worldwide celebrity during his lifetime. So was Linus Pauling and, more recently, Stephen Hawking. As the scientific world frowns upon the word celebrity, a scholar from the '70s proposed a better term for them: visible scientists. Goodell's classic study (1977) coined the 'visible scientist' to describe researchers whose public profile shapes science agendas and norms. Visibility tends to cluster around a clear signature topic, strong rhetorical skill, and recognized expertise; it brings both reach and reputational risk (e.g., the debated 'Sagan effect'). Rather than celebrating celebrity *per se*, the key question for education and policy is how visibility can catalyze two-way engagement without undermining scholarly credibility.

The idea that public communication would cut into the time dedicated to research was disproved by Jensen, Rouquier, Kreimer and Croissant (2008).

The scientific community should have received with relief and even enthusiasm data about the positive impact of time spent communicating with the general public on academic research and change their attitude toward this activity, but current data on scientists' attitude toward science communication, especially the perception of it as being helpful toward their career, showcase how slow this change is happening (Besley & Downs, 2024; Besley et al., 2018; Ecklund et al., 2012).

As Goertzel (2010) summed up:

> Faced with assaults on their professional credibility, scientists might be tempted to retreat from the world of public policy. However, allowing conspiracy theorists to dominate the public debate can have tragic consequences. Fear of science and belief in conspiracies has led British parents to expose their children to life-threatening diseases, the South African health department to reject retroviral treatment for AIDS and the Zambian government to refuse GM food from the USA in the midst of a famine. (p. 498)

Even if the perception of professional benefits from being "visible" is questionable, the impact of visible scientists on society is important (Goodell, 1977; Peters, 2013). Several interviews with Romanian scientists and STEM students were done as part of this study, and many times, a visible scientist was mentioned as the main influence over their career choices.

4. Behind the Iron Curtain: science under communism

Here we rely on historical document analysis of Soviet and Romanian sources to trace how propaganda shaped the communication and reception of science. Discussing the perception of science, especially the hard sciences, in the former Eastern Bloc is challenging without acknowledging the impact of the post-war situation on science. Science is political (Scheufele, 2014) in any circumstances and never was it more so than during the Cold War. First used by George Orwell (1945) as a way to describe the tensions between East and West, the term Cold War has been widely employed as a short-hand explanation for almost anything, from the spy tactics of the two sides to the differences in the framing of science and general knowledge (Aronova & Turchetti, 2016).

In the race to rule the world, both parties utilized science and technology as fields of battle, attempting to conquer territories of human knowledge and outer space, rather than actual, terrestrial territories, on which they were wary of waging war. The Soviet propaganda dealt with a general revision of history, to expunge or contest anything that did not align with the Marxist theory and identifying and promoting any scientists from the communist area as the authors of all significant scientific discoveries and inventions (Froggatt, 2006).

Some claims to fame are more than justified, from Mendeleev's periodical table of elements to Pavlov's classical conditioning experiments (for which he got a Nobel prize in 1904), but most of them were just propaganda (Olšáková, 2013).

The history of science is full of instances of simultaneous inventions or discoveries: Newton and Leibnitz for calculus, Darwin and Wallace for

evolution, Salk, Sabin and Koprowski for the polio vaccine, but the Communist revision of history not only favoured the scientists and inventors born on the territories then behind the Iron Curtain, it actually misattributed discoveries and even misrepresented entire scientific research areas (Brannigan & Wanner, 1983).

Although the communist propaganda systematically tried to claim for Eastern Europe as many scientific and technological discoveries as possible, the public was not easily duped. One joke from the time illustrates the position perfectly: "Who discovered the radio?" "Popov. He discovered it under his bed, where Marconi left it". The general derision undermined the Communist Party's line. However, it did not completely obliterate it, as, to this day, many older inhabitants of the Communist block are convinced that Western propaganda robbed them of the status their country deserved in the general order of knowledge and valour.

The radio transmitter invented by Popov and not Marconi, is a simple misattribution. The long list of inventions attributed to Russian scientists in Danilevski's 1947 book (the principle of conservation of the matter was discovered by Lomonosov, not Lavoisier; the first plane was built by Mojaiski in 1881; Polzunov, not Watt, built the first steam engine; the first light bulb is attributed to Lodygin, not Edison) is just an overzealous application of communist enthusiasm (M.D., 1948) (Boia, 1993). But the case of Lysenko and the denial of the scientific basis for agriculture resulted in an impossible-to-evaluate number of deaths, both because of the incarceration and deportation of scientists who espoused different ideas and to the disastrous impact on agriculture over the 1930s-1950s in the USSR and the rest of the Communist world, according to Froggatt (2006) and deJong-Lambert (2012) among others.

However, the way the Communist propaganda machine appropriated the scientific domain impacted how it was presented and perceived. Science was politically charged, with theories, subjects, and research areas that were approved by the prevailing political ideology. The aim of science communication, or popularisation, as it was known in that era, was less to promote science appreciation or science knowledge, and more to support the claim of superiority of the communist way of life, based on the communist

doctrine (Olesk, 2017). The race to conquer outer space made math, physics, and engineering highly regarded and highly funded areas. Conversely, tenets contradicting the Marxist fundamentals of the communist doctrine made cybernetics and genetics no-go areas (Graham, 1993). The history of science during communism is much more complex than this chapter can encompass, with successes and failures, confirmations and denials, country-by-country specifics, and a shared mythology. The primary influence of communist regimes on the communication and reception of science and scientific ideas was the appropriation of science and technology by communist theorists as tools for progress and as weapons in the war for world domination.

Under heavy ideological scrutiny, both for the in-field theories and real-life political opinions, scientists behind the Iron Curtain managed to engage in real scientific research and produce world-renowned science in areas as diverse as physics and math: Fock and Kolmogorov, psychology: Vygotsky and biology: Oparin (Graham, 1993). Science was promoted as a panacea for a range of problems, including religious beliefs, which Marx (1843) presented as the "opium of the people"; poverty; ignorance; a lack of moral fibre; and a bourgeois mentality (Andrews, 2016). Science and technological education were useful in levelling up the working class, both in the Soviet Union and its satellites. This environment has given rise to a visible effort to bring science and technology to the people. Nevertheless, the excesses of the Stalinist regime, where many scientists were imprisoned, persecuted, and even killed, combined with the oppressive methods of the ruling class in the communist bloc, made the popularisation of science an exercise in propaganda (Roth Ey & Zakharova, 2015), with a small, albeit visible, impact on society.

As with all propaganda, both those affected by it (the public) and those wielding it (the scientists) developed a twisted reaction to science communication. First duped, then wary, the public lost trust and respect for science (Borissova & Malkov, 2020). The scientists themselves saw all communication and popularisation as propaganda. They refused to get involved in it, especially after the fall of the communist regime and the development of more democratic societies in the former Warsaw Pact countries, as shown by the still visible difference of trust in public institutions, including scientific ones, between the Western democracies and the post-Communist ones (Cologna et al., 2025).

This foray into the history of science in the Communist countries paints a picture of the way the norms around science, science education, and science communication have been formed in Romania.

5. Romania's scientific landscape after 1989

Findings in this section integrate document analysis with themes emerging from interviews with Romanian scientists and students regarding engagement norms and incentives. The presence of Elena Ceauşescu further complicated public understanding and interest in science in Romania during the communist time. The Romanian dictator's wife was the self-appointed "first scientist of the country", based on a body of research in organic chemistry. A network of genuine researchers performed the substantive work she presented as her own, enabling her to secure titles from prestigious international organisations through political pressure or blackmail (Ungureanu & Eremia, 2016). Her name as the first researcher on many papers and the political pressure of the Communist Party got her a PhD in Chemistry, despite never graduating high school (Betea & Cioacă, 2022). The gap between international renown and the obvious lack of scientific knowledge of the first lady of communist Romania impacted the public perception of science and the scientific community. The aggressive promotion of working-class academics and scientists, educated on a fast track and with little regard for their knowledge and academic output, undermined the scientists' public image (Sorescu-Marinković, 2017).

During the Communist regime, the time spent popularising science in the form approved by the Communist Party was rewarded with money and praise from party representatives. No such incentives were available for science communication activities after 1989 (Boia, 1993; Tismaneanu, 2003). After trying to distance themselves from propaganda or state-sanctioned popularisation of science during the communist reign, Romanian researchers were exposed to norms that disincentivised any form of public outreach. More than 35 years later, they are less prone to engage in public communication or popularisation activities, partially as a result of this situation (Unitatea Executivă Pentru Finanţarea Învăţământului Superior a Cercetării Dezvoltării şi Inovării & Spanache, 2025).

Compounding this are broader systemic problems, such as chronic underfunding of research, brain drain, and the diminishing prestige of local academic institutions, all of which have undermined the scientists' morale and strained their relationship with the public (Iacob, 2018).

Nonetheless, a few public figures in science did emerge, and their influence is still felt today, either by those who are now engaged in scientific careers or those who still harbour a passion and a deeply rooted curiosity about the world and the scientific efforts to explain it (Popa, 2008).

A series of interviews with Romanian science journalists yielded a diverse and inconsistent list of visible scientists from the communist era, with names mentioned more than once being those of scientists from applied sciences (medicine, technology) who made a significant impact.

As with Dr. Barnard, the South African physician who performed the first heart transplant in 1967 (Joubert, 2018), Dr. Ana Aslan became famous in Romania after she was internationally celebrated for her anti-ageing treatment (the effect of procaine on arthritis, which she then researched as an anti-ageing cure). Other scientists were celebrated and respected for their contributions to science and society, but they did not necessarily reach out to the public in a consistent manner.

Grigore Moisil, probably the best-known Romanian mathematician, was one such a visible scientist. He was almost 40 when the communist regime started in Romania and already a well-known name both in his country and outside. His academic career continued under communism, and he managed to open the Computing Centre of the University of Bucharest in 1962. His interests were in algebra, but also logic, engineering, and philosophy. He was a great speaker, and as soon as mass media discovered him, they never let him go until his death in 1973. His humour was appealing, which he structured on math and logic in a transparent and thus educational way. Solomon Marcus wrote,

> Many of his jokes have a mathematical structure. Here is a joke illustrating the recursive thinking: 'Every man has right to a glass of wine; but when you drink a glass of wine, you become another man' (the corollary: every

> man has right to infinitely many glasses of wine).” and “Jokes having the same pattern, being so able to be produced algorithmically: ‘The water is bad, even in the shoes’; ‘everything can be proved; even the truth’; ‘you can fall in love with any women; even with your wife’; ‘every joke can make you be in the best mood; even the above ones’. All these jokes have the confusion between normality and exceptionality as a common denominator: the water in the shoes, the proof of truth, to be in love with your wife. As soon as you understand the pattern, you can produce infinitely many jokes of similar type. (Marcus, 2006, p. 76)

Solomon Marcus, a well-known and well-loved mathematician, was also a visible Romanian scientist before and after 1989. His work in computational linguistics, mathematical analysis and computational sciences allowed him to interact with a wide area of society (Spandonide, 2010). He wrote books aimed at the general public and was a familiar presence in mass media, which increased his impact on the public and on his expertise areas (1988), (1989), (1991), (2003), (2011).

Some other names were mentioned as well: George Emil Palade, Nobel prize laureate and father of modern cell biology; Horia Hulubei, nuclear physicist and founder of the Romanian Nuclear Physics Institute; Gheorghe Mărmureanu, seismologist and honorific director of the Romanian Institute of Earth Sciences; and Magda Stavinschi, astronomer and mathematician and former director of the Romanian Academy Astronomical Institute. Some of them were quite active after 1989 as well.

Magda Stavinschi is one of the few women in this group and also one of the few whose visibility persisted during the transition from the communist regime to the current one. She has been a recurring guest on TV and radio shows, a familiar name discussing astronomy and other hard sciences until very recently. She is still active; she participates in conferences for specialists and the wider public, has more than 300 scientific papers (half in peer-reviewed journals) and writes books about the history of science (Stavinschi, 2019).

More recently, the number of visible scientists in post-communist Romania dwindled. One issue is the state of scientific research, marred by the depletion

of people and funding, as well as mismanagement and lack of vision (Cernat, 2024). Additionally, the scientists who are still active in Romania or abroad seem less inclined to engage with the public than most of their colleagues in Western Europe, America and Asia. The old-fashioned attitudes toward scientists who are interested in being visible are still prevalent: the scientists fear losing credibility among their peers if they are seen as being too accessible to the public if they "lower their standards in order to be understood by the non-specialists" (according to a conversation heard by the author).

One prominent exception is Cristian Presură, a Romanian physicist currently working for Philips Research Eindhoven, who has written, to date, two books about physics: "Fizica povestită" (Physics Told as a Story) (2013) and "O călătorie prin univers. Astrofizica povestită" (A Journey through the Universe: Astrophysics Told as a Story) (2019) and has taken part in several hundred meetings with school and high-school students, science fans and enthusiasts, has spoken at public science conferences (Presură, 2018), has his own YouTube channel (2019) and is active on social media on other scientific subjects as well.

Other well-known scientists in Romania these days are either physicians (Mihai Craiu, Vasi Rădulescu, Oana Cuzino) or have studied abroad in universities where public engagement was part of the curriculum (Aurora Simionescu, Liviu Giosan, Albert Laszlo Barabasi). The latter presence in the public sphere results from the universities' strategic attention toward preparing future scientists for a career in which public engagement, in its many forms, is an important part of their job description.

Following in the footsteps of Goodell (1977), an assessment of the presence of visible scientists in society and their area of expertise and impact is a useful tool to evaluate the potential norms surrounding the scientific research professions. This is relevant to the way science is perceived in Romania, because, according to the Theory of Planned Behavior (Ajzen, 1991), norms are one of the potential factors driving interest and intent to engage in both science education and science outreach.

6. Where engagement falls short today

Romanian policy does nominally recognise the scientist's obligation to share scientific knowledge and the education system's role in cultivating this skill (Ministerul Educaţiei Naţionale şi Cercetării Ştiinţifice, 2014). The European Commission's Horizon 2020 program, especially its Science with and For Society arm (2019), likewise encourages researchers to collaborate meaningfully with the public:

> The specific objective is to build effective cooperation between science and society, to recruit new talent for science and to pair scientific excellence with social awareness and responsibility. (European Comission, 2019)

However, Romanian institutional participation has so far been minimal. Formal requirements for dissemination in funding programs often result only in perfunctory local conferences that the general public seldom attends, as observed by the author in several instances. And the lack of scientific discourse from the public space is a problem for many different reasons.

The state of scientific literacy in Romania is dire. According to the latest data from PISA (OECD, 2023), TIMSS (von Davier et al., 2024) and other multi-country evaluations of youth literacy and scientific competency (Bârz, 2016), Romania lags far behind other European countries. The knowledge and understanding of basic scientific tenets of Romanian adults are also unsatisfactory (Vlăsceanu et al., 2010), with 80% lacking both basic knowledge and an active vocabulary for scientific facts. According to a recent European Commission Report (2015) Romanians were optimistic about the future and trusted science and technology to improve their lives significantly. Their perception of recent scientific and technological innovations was mostly focused on gadgets, electronics and household appliances. Still, the enrolment in the science, engineering and technology areas of tertiary education is low, so it can be construed that Romanians expect a better future, but they also expect someone else to build it. This attitude is problematic for Romanian society. Scientists should have a goal to communicate more, better and more appropriately with the broader public, to inspire and engage the younger generation toward a more active and informed involvement in STEM.

With a system that is not strategic in its drive to increase the cooperation between the public and the scientists, with no means of achieving even the goals it has set for itself, with no models (the visible scientists) and no natural inclination from either of the players (public, scientists) to get involved, the gap will only increase. The less interested the public gets in science and its workings, the worse the future of our society will be (Tobey, 1971).

Even scientists will lose if they do not change their attitude toward the public (Grundmann, 2017), as, in today's world, the conceptual distinction between the specialist and the layman is more difficult to define, as most people are experts in some areas, and laymen in all others. Furthermore, each expert has such a narrow area of expertise that even people working alongside them have difficulties following up on each other's advanced research work. There is a need to change how science is present in society and change could start in the higher education system if not earlier. Just as a country cannot rely on a few teachers who are innately good at their job and passionate about it for its survival and its future, Romania cannot rely only on a handful of visible scientists who are good at reaching out to the public because they have a personal inclination for public engagement. Science outreach courses, training programs and policies are needed to bring as many young and not-so-young researchers into the public arena. The current situation showcases how creating a context that would bring more scientists in society, more science in the agora, would not only increase the scientific literacy of the public, but also contribute to building a sound, democratic society where the most important decisions are made according to evidence-based recommendations.

The current situation stems from the past and this past can provide suggestions for future development as well as areas where changes can have the biggest impact. The public attitudes and understanding of science in Romania is a poly-crisis and it needs multi-solutions, in the sense of interventions that address several issues at the same time and do not patch things up one at the expense of the other (Tataj et al., 2023). Policies and measures designed to increase the visibility and public engagement of young researchers at the national, local, and institutional levels offer clear benefits, including a rise in higher education enrolment, an enhanced pool of well-prepared primary and secondary teachers, and a stronger and more dynamic research

community. Moreover, fostering greater visibility for researchers also supports broader democratic processes, encouraging informed public participation and engagement within Romanian society.

7. Conclusions

This paper traced the figure of the visible scientist across Romanian history and connected this visibility to present-day engagement norms. While the evolution of science in society parallels that of the rest of Europe, the communist era propaganda instrumentalized science, eroding trust and entangling "popularization" with ideology. After 1989, the trust in scientists was further eroded by the brain drain phenomenon and the absence of visible scientists from the public sphere. Special case sketches (Moisil, Marcus, Stavinschi, Presură) illustrate how credible, dialogic visibility of scientists, in any type of political climate, can inspire youth, normalize science-society exchange, and counter legacies of mistrust.

This can suggest a series of recommendations. In higher education, the focus on programs that would increase the competency of young researchers in relation to public engagement is long overdue. Furthermore, the inclusion of public engagement in the academic criteria for recognition, hiring, or promotion would support the norms surrounding this kind of activity.

To support this, policy and funding changes are also needed. Dialogic dissemination of research results in schools, in mass media, in society needs support and, in return, it should be evaluated on quality rather than quantity. The audience fit and public orientation of visible scientists is what made them relevant, and this, rather than simply checking a box, is what is needed. But the change in norms requires more than training and funding: the ecosystem of science in society is the context in which the visible scientists appear and thrive. Academia, schools, museums, mass media can and should be responsible for bringing more science in society.

Increasing the visibility of early-career researchers is a low-cost lever to boost STEM interest, widen the pool of future teachers, and strengthen evidence-informed public deliberation in Romania.

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