

Limits of the freedom to perform the research profession and significance of research ethics and researcher's deontology.

A case study of respect for intellectual property rights when publishing research results - part II

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Abstract—The term 'profession in which the public repose confidence', under Article 17 of the Polish Constitution, is a constitutional term in Poland. The Constitution provides that the legislator may create professions of public trust to protect important categories of public interest. Self-government of a public trust profession, within the limits of that interest and for its protection, is entitled to represent the interests of persons exercising such professions and, moreover, to supervise the proper exercise of the profession. This paper demonstrates that the profession of a scientist fulfils the prerequisites of a profession of public trust. Scientists performing professional research activities in the institutions within the system of higher education and science form an international scientific community. At various jurisdictional levels, this community has been universally mandated to define the principles of ethics in science and the deontology of the research profession. In shaping these principles, the research community must safeguard the public interest by protecting public faith in science and its achievements. The task of overseeing proper conduct of research by scientists as persons of public trust is, in turn, entrusted to the ethical and disciplinary committees established in the system of science. In this paper, we examine the rules in force in the scientific community for respecting intellectual property rights when publishing research results and then, in a survey, clarify whether these rules are known to and applied in the international academic community.

Keywords— research responsibility, public trust, constitutional characteristics of public trust profession, freedom of science, intellectual property rights, ethical rules of authorship attribution

I. PUBLIC TRUST PROFESSIONS VERSUS LIBERAL PROFESSIONS AND REGULATED PROFESSIONS

In the first part of this thesis, we posited that the science profession exercised professionally in a scientific and research institution fulfils the constitutional prerequisites of a profession of public trust. Two critical issues need to be addressed to confirm the correctness of this finding. Firstly, the concept of the profession of public trust is a specific feature of the Polish legal system with characteristics not widely known in other European countries (Antkowiak, 2013, p. 135). This concept was introduced into the Polish legal system by the provision of Article 17(1) of the Constitution of the Republic of Poland. On the one hand, this article does not contain a legal definition of the term profession of public trust and, on the other hand, it resolves that professions of public trust may be created by law through the establishment of professional self-government.

Consequently, the constitutive features of public trust professions had to be defined in the literature and jurisprudence, particularly that of the Constitutional Tribunal. It follows from the findings of the science of law that the assignment of a profession to the category of a profession of public trust requires that it be endowed with attributes specific to that type of profession. In the first part of this work, relying on the



premises outlined in Article 17(1) of the Constitution of the Republic of Poland, we established that the essence of such professions lies in the obligation to practice them within the confines of the public interest and for the purpose of its protection. At the same time, the object and scope of the public interest relevant to a given profession should be defined by law. To achieve such a defined objective, however, it is necessary to establish by law an entity or a group of entities that perform two constitutional tasks in the public interest. Firstly, to represent the interests of this professional group vis-à-vis the institutions of the state, and secondly, to exercise supervision over the proper practice of the profession within the limits of the public interest and for its protection. In formulating these requirements, the legislator determined that using a law, it may establish professional self-governments of the professions of public trust, which are then also entrusted by law with the performance of both tasks. Using the formula “*by law it is possible*” instead of “*by law is created*”, professional self-government is of fundamental importance, especially for the possibility of qualifying the profession of scientist as a profession of public trust. It is undoubtedly the case in which persons practising the research profession in Poland do not have a self-governing organisation established by law. Against this background, the question arises: is it correct that the qualification of the scientific profession as a profession of public trust made in the first part of our work? Looking for an answer to this question, two issues should be considered. Firstly, whether the lack of establishment of a formal self-governing organisation by law excludes the possibility of classifying the scientific profession as a public trust profession. Secondly, whether it would be more appropriate to characterise the scientific profession as a “liberal profession” or a “regulated profession”. A negative answer to both questions should, later in the paper, lead us to observation that the constitutional features of the public trust profession are fulfilled in the characterisation of the scientific profession.

Answering the first of the questions, it should be emphasised that the linguistic (literal) interpretation of the wording of Article 17(1), which states that “*by means of a law, professional self-governments may [and need not - A.Ch. J.D.] be established*”, leads to an obvious conclusion. The Constitution of the Republic of Poland does not prejudge that the sine qua non-element of the concept of “*profession of public trust*” is the existence of a self-governing organisation which represents persons practising the profession in question and exercises supervision over its proper performance by members of the self-government. This means that these tasks may, by law, be entrusted to an entity or group of entities other than the professional self-government. It is worth adding here that, from the perspective of providing an appropriate guarantee for the public interest, the most important is the function of exercising care over the proper practice of a given profession. The essence of this function is expressed by granting two authorities in the legal act of self-government organization. Firstly, the law-making competence to determine within the intra-corporate regulations the code of ethics of a given profession of public trust. Secondly, the competence to enforce disciplinary

responsibility on self-government members in case of committing acts contrary to the law, violating the principles of ethics or professional dignity, or breaching professional duties. However, the legislative aim of this constitutional goal can be achieved in another way. However, the legislator can achieve this constitutional objective in other ways. This is pointed out by Hubert Izdebski, who writes that “*for some professions of public trust, professional self-governments may exist at the will of the legislator, while other professions of public trust may not have a self-governing organisation*” (Izdebski, 2012/2013, p. 77). Of course, this issue is sometimes controversial in the literature. However, in view of the literal wording of the analysed provision of Article 17(1) cited above, it is impossible to agree with, among other things, Krystyna Wojtczak, who states that: “*(...) the sine qua non-element of the notion of “profession of public trust” is the existence of a professional corporation, and only such a corporation which is to take care of the proper practice of the profession for the protection of the public interest and within its limits, (...)*” (Wojtczak, 2002, p. 41).

In conclusion, a sine qua non-condition for qualifying a profession as a public trust profession is the existence of an entity that ensures the proper exercise of that profession for the protection of the public interest and within its boundaries, based on the deontology of the profession previously defined by that entity in formalised, legally binding documents. The legislator may entrust this task to an entity other than the self-governing organisation of that profession.

When looking for an answer to the second question, it cannot be disputed that the term “profession of public trust” is not identical in scope to the terms “liberal profession” and “regulated profession”. As indicated by Andrzej Krasnowolski, the term “liberal profession” refers to a profession “*exercised based on appropriate education, independently (which does not necessarily mean individually) and on its own responsibility in a professionally independent manner, to offer intellectual or conceptual services in the interest of the client or the public interest. Important features inherent in the practice of a liberal profession are the mission of the profession, the observance of deontological rules, the assurance of professional secrecy and trust to clients, and the bearing of special responsibility by how the assignment is carried out*” (Krasnowolski, 2013, p. 3). The liberal profession, understood in this way, has a very long history (Krasnowolski, 2013, p. 4-7). It is the oldest profession among the three mentioned above. In the Second Republic of Poland, the term appeared expressis verbis in, among other things, Article 3 of the Ordinance of the President of the Republic of Poland of 27 June 1934 - Commercial Code and in Article 76 sentence 1 of the Constitutional Act of 23 April 1935. Currently, the term 'liberal profession' functions, among other things, based on the following acts: of 29 August 1997 - Tax Ordinance (Article 3, point 9) and of 15 September 2000 - Commercial Companies Code (Article 86, Article 88). However, none of the cited acts contains a legal definition of “liberal profession”.

Analysing the characteristics developed in the literature of the terms “public trust profession” and “liberal profession”,

which lack legal definitions, it may be assumed that the scopes of both these terms intersect but are not identical. Consequently, not every liberal profession will be able to be recognised as a profession of public trust, and vice versa; not every profession of public trust will be a liberal profession at the same time (Wojtczak, 2002, p. 40-41). Hence, a profession based on a person's creative activity (e.g., an artist or writer) will fulfil the prerequisites of a liberal profession but not necessarily a profession of public trust. At the same time, the professions of the advocate or legal adviser exercised within legal corporations will fulfil the prerequisites of both a profession of public trust and a liberal profession. Nevertheless, professions exercised in public service, e.g., a judge, may only be qualified as professions of public trust (Bojarski, 2006, p. 219-220). The literature emphasises that professional self-governments of the liberal professions or other organisations are mainly independent of the state, their members are equal, and they elect their representation within the corporation in democratic elections. In addition, this type of professional self-government has extensive competencies in self-regulation within the self-government, creating an internal disciplinary justice system, conducting professional recruitment, and training according to self-defined rules.

At the same time, the professional self-government of a public profession ensures the proper practice of the profession within the limits of the public interest. Notably, when such a profession is connected with public service, it is characterised by much less independence. Often, the authorities of the entity representing such a professional group are not equipped with the competence to self-regulate, both in terms of their own activities and how they exercise their profession. For example, a judge's independence concerns only the adjudication sphere. Administratively, a judge is subject to their superiors. The activities of judges and their professional self-government are defined in detail by the legislator. The professional self-government of judges signifies a form of representation of the profession. Still, it does not constitute self-government within the meaning of Article 17(1) of the Constitution of the Republic of Poland since a judge cannot perform a decentralised function of the state, as he does not adjudicate on his behalf on his own responsibility, but on behalf of the Republic (Stępień, 2002, p. 93).

This analysis shows that it is impossible to qualify the scientific profession as a liberal profession. Although its essence is expressed in man's creative activity, how it is practised is not free. Scientists are constrained by the principles of the art of research and the pursuit of discovering the truth about the world around us and the phenomena occurring in it, and the obligation to act in the interest of the public good identified as working to advance the existing knowledge. A scientist can only call themselves a person who respects the principles of the scientific method in their research activities. Additionally, when a researcher performs their profession within the formalised status of a scientific and research institution employee or a doctoral student at such an institution, their professional activity is determined by law by a kind of public service. This is pointed out by Robert Tabaszewski, who

argues that the academic profession is recognised as a function of particular importance for developing a given society in the European legal space.

Moreover, as a *sui generis* public service, expressed in the mission to develop science and raise the awareness of young generations of researchers, following the views of legal doctrines, it can be associated with the feature of public trust referred to, among other things, in Article 17 of the Polish Constitution. The cited author emphasises that this finding is correct, despite the lack of formal separation by the legislator of a "corporation" associating all academics, as is the case with other types of groups guaranteeing the so-called "higher order goods", e.g. doctors, architects, or lawyers (Tabaszewski, 2020, p. 173-186). The position of the authors of this work goes one step further. We think that the profession of a researcher, especially when exercised in a scientific and research institution and within the framework of a formalised legal relationship, not only may be associated with the feature of public trust but, as exercised in public service, constitutes *sensu stricto* a profession of public trust.

Returning to the second concept cited at the outset, it should be clarified, following Krasnowolski, that the term "regulated profession" means a profession "*the practice of which requires the possession of specific qualifications and is allowed only after obtaining a permit, which can be obtained only after fulfilling the requirements set out by the legal regulations of a given state (e.g. passing an exam, completing the required professional practice, obtaining registration on a list, completing appropriate education or training)*" (Krasnowolski, 2013, p. 3). In Europe, the status of 'regulated profession' is held by the vast majority (about two-thirds) of the liberal professions. This concept, like the liberal professions, can intersect with the concept of a profession of public trust. In the case of researchers who perform their scientific activity not only within the framework of the constitutional freedom of scientific research but also within the framework of a formalised legal relationship with a scientific research institution, the prerequisites characterising both professions are obviously fulfilled. They exercise both a regulated profession and a profession of public trust.

II. RESEARCH PROFESSION AS A CONSTITUTIONALLY COMPLIANT PROFESSION OF PUBLIC TRUST

For a profession to be recognised as a profession of public trust, several issues must be institutionalised in the law. Firstly, it is necessary to define the category of public interest that will determine the object and scope, and thus also the limits, of the freedom to practise this profession. The legislator has already done this in the preamble to The Law on Higher Education and Science, stating, "understanding the fundamental role of science in the creation of civilisation, the rules for the functioning of higher education and the conduct of scientific activities are hereby established based on the following principles: (...) (2) every scientist is responsible for the quality and reliability of research and for the education of the young

generation, (3) higher education institutions and other research institutions carry out a mission of particular importance for the country and the nation: they make a key contribution to the innovativeness of the economy, contribute to the development of culture as well as to the establishment of moral standards in public life." This delimited the scope and purpose of the object of research activities and obliged scientists to be accountable for the integrity and accuracy of scientific findings announced to the public. At the same time, by the law above, access to public funding for research was linked to the state's science policy, which is defined every five years and subject to evaluation.

Secondly, specific organisational structures are required to be established by law, which is endowed with particular competencies (Krasnowolski, 2013, p. 14) to:

- 1) represent the interests of the profession concerned vis-à-vis state institutions;
- 2) safeguard the proper exercise of the profession concerned within the limits of the public interest and for its protection, which is concretised by the following powers:
 - a. supervision of the proper exercise of the profession, particularly concerning ensuring that access to the profession is regulated and that registers are kept of those who have the right to exercise the profession, including the right to use the relevant professional title;
 - b. shaping the principles of professional ethics and ensuring that they are respected in the exercise of the profession, including through the definition in official and legally binding documents of professional deontology;
 - c. exercising specialised disciplinary jurisdiction over practitioners of the profession;
 - d. overseeing continuing professional development with the definition of professional training programmes.

All the requirements mentioned above are fulfilled concerning research or research and teaching staff in the Polish system of higher education and science and persons formally affiliated with its institutions (doctoral students) who are professionally engaged in research activities. The Law on Higher Education and Science regulates these issues precisely. Firstly, the community of researchers employed at research institutions forms a community to which membership is subject to registration. Secondly, the interests of this community about the institutions of the state are adequately represented and institutionalised. Thirdly, properly executing research activities is subject to the custody of institutions established by law. The possibility of exercising the freedom of scientific research and the obligation to conduct research in a manner consistent with the principles of the scientific method and professional ethics are supervised by specialised institutions that form a kind of disciplinary court system. The task of these institutions, by the custom public-law competence of professional self-governments, is to enforce the professional responsibility of scientists (Szydło, 2002, p. 46). These institutions have also been endowed by law with the right to define the rules of practice of the profession in the form of codes of professional

ethics.

It should be recalled that if a scientist conducts research activities professionally and obtains research funding from public funds, this is inextricably linked to getting the status of a researcher in the structure of institutions co-creating the Polish scientific and research infrastructure. According to Polish legislation (Act of the Law on Higher Education and Science, hereinafter also referred to as l.h.e.s.; Act on the Polish Academy of Sciences; Act on Research Institutes), the most critical institutions co-creating it include universities, the Polish Academy of Sciences and research institutes. Doctoral students and employees in research or research and teaching staff positions obtain researcher status in such institutions. One of the essential duties of employees and doctoral students in these institutions is to carry out scientific activities, which, according to Article 4 of The Law on Higher Education and Science, includes scientific research, development work and artistic creation. Scientific research is an activity that provides for basic research and applied research. By the requirements for public trust professions, obtaining the status of a doctoral student or employee of a scientific and research institution is regulated in Poland. In the case of employees, they are required to fulfil the statutory prerequisites for employment in a position whose scope of duties includes the performance of professional research activity. In the case of doctoral students, it is using a competition whose purpose is to verify their suitability for research (Article 119 & Article 200(2) l.h.e.s.). By virtue of the Act, a register of persons with the researcher status and the right to practice this profession is kept. This is the POL-on Integrated Information System for Higher Education and Science, referred to as the "POL-on System". It constitutes an ICT system containing a database including, among other things, a list of academic teachers conducting scientific activity and persons involved in its conduct, and a list of persons applying for the degree of doctor (doctoral students) (art. 342 - art. 346 l.h.e.s.). The data contained in the POL-on System are made available to the public free of charge on the Internet through the RAD-on System, which publishes data on researchers, initiated proceedings on the awarding of an academic degree or professor title, together with the results of these proceedings, data and analyses on the system of higher education and science in Poland.

Publicly available databases also contain a register of individuals awarded doctoral or postdoctoral degrees and the title of professor, respectively, through a formalised promotion procedure. The subject matter and nature of academic achievement and the conditions for the conferral of both degrees and the title of professor are defined by The Law on Higher Education and Science. This law resolves that degrees are conferred by the collegiate bodies of scientific research institutions to which such powers have been granted, and the title of professor by the Council for Scientific Excellence. The Council is a central body of government administration within the scope "*to ensure the development of scientific staff in accordance with the highest quality standards of scientific activity required to obtain academic degrees, art degrees and the title of professor.*" (art. 232)

Researchers are also duly represented in the institutions of the state in the institutionalised manner. Both their individual and collective interests are protected, and various institutions are established to organise self-help for members of the research community and to integrate this professional community. Their tasks include improving working and pay conditions, ensuring professional independence, and ensuring the highest professional standards and researcher's deontology (ethics) are observed.

In shaping the regulations governing the procedures for awarding scientific degrees and titles, the research community is represented by the Council for Scientific Excellence, which scientists create. The task of evaluating the research activity of scientific and research institutions and their employees has been entrusted to another central body of government administration - the Commission for the Evaluation of Science.

In turn, the scientific community gained a quasi-self-governmental organisation within scientific disciplines by virtue of the Act on the Polish Academy of Sciences. The Act determined that the corporation of the Academy also includes scientific committees, which are self-governing representations of a discipline or related scientific disciplines serving to integrate scholars from all over the country. The General Assembly of the Academy forms the committees. The scientific committee is composed of national members of the Academy according to their scientific specialisation and persons elected by the relevant scientific community.

Under The Law on Higher Education and Science, an academic teacher shall be subject to disciplinary liability for any disciplinary misconduct which constitutes an act which defaults on the duties of an academic teacher or which offends the dignity of the academic profession (art. 275). A doctoral student shall be subject to disciplinary liability for any act which offends the dignity of the doctoral student (art. 322).

Disciplinary proceedings are carried out in the scientific research institutions whose employees or doctoral students the defendant is. The object and scope of responsibility for acts that offend the dignity of the academic profession are specified in the deontology of the research profession, which, by virtue of the Act on the Polish Academy of Sciences, was defined in the code of ethics of a scientific employee by the Commission for Ethics in Science (Article 39). The commission above is the guardian of ethics in science and has been equipped by the legislator with several competencies, allowing it to carry out these tasks. This committee may: (1) express opinions on cases of violations of ethics in science by a researcher, including at the request of disciplinary committees; (2), on its initiative, refer cases of breaches of ethics in science by employees to the relevant disciplinary committees with a recommendation to investigate the case.

It is clear from the analyses carried out that concerning the profession of the researcher, the legislator has more than met the constitutional requirements for the creation by law of a profession of public trust, which is the profession of the researcher.

III. PROTECTION OF INTELLECTUAL PROPERTY IN RESEARCH ETHICS AND RESEARCHER'S DEONTOLOGY

In the Code of Ethics for Scientific Workers, adopted as an annex to Resolution No. 2/2020 of the General Assembly of the Polish Academy of Sciences on 25 June 2020, considerable attention is given to protecting creative contributions to collaborative scientific projects.

The authors of the Code have noticed a significant dissonance between the needed protection of science creators and the right to be recognized as the author of a work, which is defined in various countries' regulations of intellectual property law, including the Polish Act of 4 February 1994 on Copyright and Related Rights. The "author" or "creator" is the person who introduces changes in the world through their own creative and intellectual effort and creates a work. The work protected by law should be fixed in any tangible medium using a form of expression for intellectual works. These forms include words, mathematical symbols, figurative marks or models. According to Copyright, the authors are not creators of discovery, idea, procedure, method or theory until their intellectual work is expressed in any material form using the channels above (Chorażewska†, Stanimirova & Oster, 2023, p. 519-521).

The authors of the Ethics Code and earlier the scientific community noticed that intellectual property law does not adequately correspond, particularly to the specificities of conducting research and publishing its results in hard sciences, technology, and the natural sciences. This dissonance becomes particularly evident when the participation of a specific team member in the research process is not strictly concretized in the creation of a section of the manuscript of a scientific publication, i.e., a contribution to a multi-authored work is not a work according to Copyright (Chorażewska†, Stanimirova & Oster, 2023, p. 518-523).

The lack of a direct and intuitive reference to the rules of Copyright to authorship attribution of scientific work regarding all possible categories of the outcomes of the research process means that not every author of a contribution to the scientific project will receive appropriate copyright protection. Meanwhile, in the legal culture of democratic states, protecting intellectual property in all its forms is a universally recognized human right. Property is an autonomous concept that cannot be equated exclusively with owning physical possessions. Property also encompasses intellectual property, which safeguards intangible goods that are products of human intellect. "Intellectual property" is defined in Article 2(viii) of the Convention Establishing the World Intellectual Property Organization (Journal of Laws 1975, No. 9, item 49; done at Stockholm on 14 July 1967 and amended on 28 September 1979) as "rights relating to: Literary, artistic and scientific works; artistic performances, phonograms, radio and television broadcasts; inventions in all fields of human activity; scientific discoveries; industrial designs; trade and service marks, trade names and signs; protection against unfair competition, as well as all other rights emanating from intellectual activities in the industrial, scientific, literary and artistic fields." In light of the norm above, intellectual property constitutes a set of subjective

rights that serve the creators of intellectual products. Consequently, as long as the product of human thought, created in a strictly creative act, possesses an individual and original character that exists independently of its author and can be perceived by individuals other than the creator, it is considered an intangible good protected by intellectual property law. An intangible good defined in this manner may result from human creative activity in industry, science, or art.

The Integrity in Research and Respect for Intellectual Property document highlighted this problem, emphasizing that: *“Scientific activity, like all creative work, is a domain of freedom. The belief in the autonomy of scientific research may sometimes cause creators to approach with absolute discretion the origins of their own works, including the designation of authorship. These issues are regulated by law, and any person responsible for indicating the information on authorship of a work that he or she submits to a publisher must be mindful of the obligation to comply with the relevant legal provisions on what is meant by authorship. Of these provisions, the most important are Articles 8 and 16 of the Act of 4 February 1994 on Copyright and Related Rights (consolidated text “Journal of Laws” 2021, item 1062, as amended). Article 8 of the Act states that the author of a work is its creator. Nevertheless, Article 16 of the Act, defines the subject matter of moral rights. They protect the author’s connection with the work, which manifests itself, among other things, in the right to mark the work with one’s name or pseudonym or to make it available anonymously. In particular, it should be noted that Polish law does not deprive of author’s rights anyone who has made even the most modest, but independent and creative, contribution to the creation of a work. Thus, a co-author is anyone who has written even a small part of the work, has made any creative contribution to its conception or arrangement, scientific research the result of which is a given work. At the same time, someone who performed (even if very important) administrative tasks related to the preparation of a scientific work (for example, as the head of a scientific institution) is not a co-author. Also, a consultant, who shares his or her knowledge and provides advice in the creation of a scientific work, does not acquire the right of co-authorship on this account.”*

It follows from the quoted statement that :

- a. ethical standards protect a direct, significant intellectual contribution to research and entitle its creator to the status of co-author of the publication;
- b. if one has made other than significant intellectual but substantial contributions, one should be acknowledged (thanked) in a paper.

Acknowledged in the paper should be dedicated to interviewers, survey management staff, data processors, computer staff, clerical staff, statistical advisers, colleagues who have reviewed the paper, students who have undertaken some sessional work, the supervisor of a research team and someone who has assisted in obtaining funding.

IV. RESEARCH CONTRIBUTION, AUTHORSHIP ATTRIBUTION, LEGAL AND ETHICAL RULES: SURVEY ANALYSIS

In our study, we examined policies governing scientific authorship and accountability for published research findings within the academic science community. Our analysis was conducted through a survey entitled "Team Research and Respect for Intellectual Property Rights in a Team Member's Scientific Creation – Questionnaire." Building upon our recent investigations (Chorążewska & Dajka, 2023, p. 19-22) we aim to provide a detailed analysis of the survey data, which was collected across five main areas. Here, we specifically focus on three key aspects:

I. Research Contribution: This involves an examination of the methods utilized to acknowledge individual contributions within the research team and the criteria used for attributing authorship to scientific works.

II. Authorship Attribution: This segment delves into the correlation between the nature, type, and extent of contributions to the research and the established practices for attributing authorship in scientific publications.

III. Legal and Ethical Standards: This part involves assessing participants' understanding of legal provisions and ethical norms pertaining to the protection of intellectual property in research endeavors.

The survey was designed in both Polish and English languages. Our primary aim is to discern the customs and practices related to authorship attribution among two distinct groups of respondents: the initial group that completed the questionnaire in English and the second group that provided responses in Polish. This straightforward, albeit somewhat oversimplified, categorization allows us to identify statistically significant distinctions between the local Polish research community and their foreign counterparts. Investigating the origins and interpretations of these differences constitutes a primary objective of our research. The survey was fully completed by 265 recipients and partially by 238 recipients for the Polish language version, and respectively, by 92 fully completed and 121 partially completed surveys for the English language version.

For our analysis, all survey participants who fully or partially completed the questionnaire were classified into subgroups based on (i) gender (labeled as 0.1), (ii) professional scientific title (labeled as 0.2), and (iii) age (labeled as 0.3). Our objective was to categorize respondents not only by language and gender but also by age and research experience, which are somewhat associated with their academic title or degree. The structure of these groups is depicted in Figure 1 of our previous paper cf. Chorążewska (2023). Below, for simplicity, we utilize notation such as II.3 to denote question 3 from the Research Contribution group and 0.1 to denote respondents' gender. A detailed list of questions and potential answers can be found in the Appendix.

The first part of our questionnaire, entitled Research Contribution, examines the method of recognising contributions to the research by individual members of the research team and the terms of attributing authorship to scientific works. The questions for this part of the survey were based on the regulations quoted in part 1 of our article (Chorażewska & Dajka, 2023, p. 19) regulations of Chapter 3.3. Authorship and Publication of the Code of Ethics for Researchers of 25 June 2020.

The survey's first (I.1) and second (I.2) questions read: *“Is the status of co-author of a scientific publication, in your area of expertise, customarily assigned only to those members of the research team who have been responsible for preparing the manuscript or its specific part?”* and *“Is the status of co-author of a scientific publication, in your area of expertise, assigned to every member of the research team being the author of an intellectual contribution to a specific scientific project regardless of whether the person has been responsible for preparing the manuscript or its specific part?”* respectively. They were designed to discover the applied rules of authorship attribution of scientific publications when publishing collaborative research results. Respondents who confirmed that authors of publications are not only those team members who created the manuscript of the publication but anyone who is the author of an intellectual contribution to a specific scientific project demonstrated that they apply the rules under the deontology of the research profession. This means that they use not only the rules of authorship according to intellectual property rights (hereafter IPR) but also the rules of scientific authorship according to ethical standards and researcher’s deontology when attributing authorship to scientific works. Questions I.1. and I.2 are of central importance for the main results of our work and we analyse them in further details.

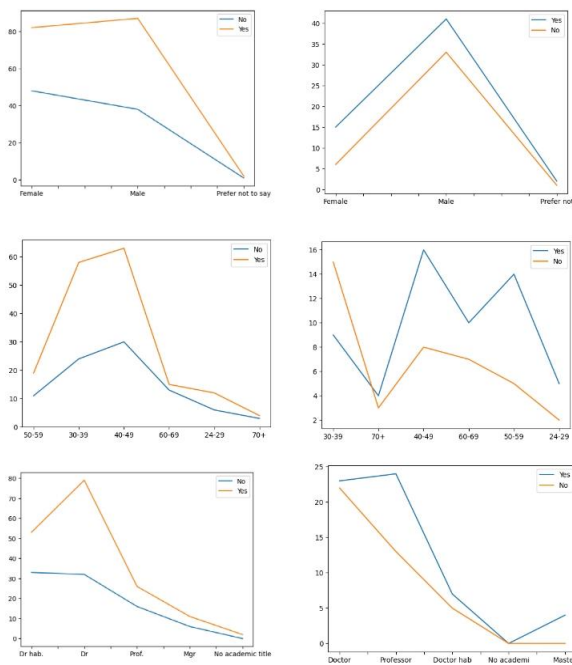


Figure 1. Answers to question I.1 versus respondents sex (first row of panels) versus respondents age (2nd row) vs respondents position (3rd row) of English language (right panels) and Polish language (left) survey. Missing answers (null values) are not indicated in the figures.

The responses to question I.1. are depicted in Figure 1. It is noteworthy to observe disparities between responses provided in the Polish-language (displayed in the left panel of Figure 1) and English-language (shown in the right panels of Figure 1) versions of the survey. The top row of panels in Figure 1 illustrates how the responses vary according to the respondents' gender. Particularly striking is the greater disparity between answers given by female and male respondents in the English-language version of the survey. Although statistical significance cannot be attributed to this observation, such a pronounced gender dependency is a notable characteristic, suggesting a social rather than legal origin.

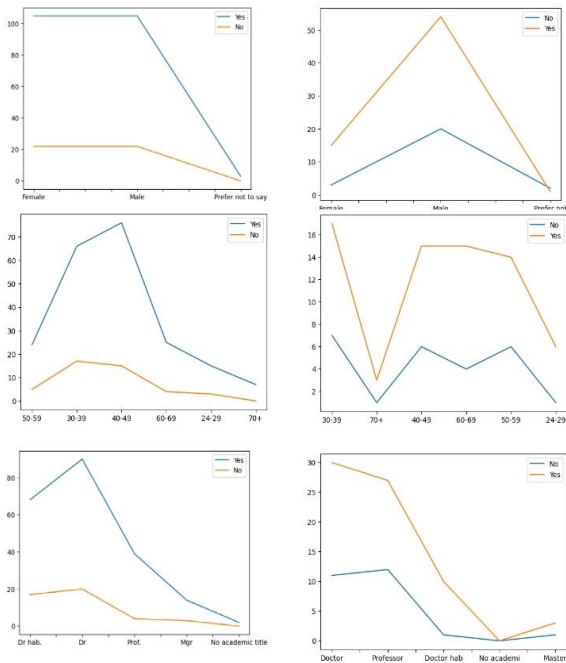


Figure 2. Answers to question I.2 versus respondents sex (first row of panels) versus respondents age (2nd row) vs respondents position (3rd row) of English language (right panels) and Polish language (left) survey. Missing answers (null values) are not indicated in the figures.

The responses to question I.2. are illustrated in Figure 2. Once more, the gender dependency highlighted in the first row of panels in Figure 1 exhibits a similar characteristic as observed in the previously discussed case of I.1. It is evident that the pattern of responses differs between female and male respondents in the English version of the survey compared to its Polish-language counterpart.

The subsequent questions aimed to determine respondents' ability to recognize and differentiate contributions to research that are standalone, creative, and substantial from contributions of a different nature. The first type, regardless of its form of expression and even when it does not meet the requirements of a contribution to a multi-author project as a contribution work, entitles its author to be recognized as an author of the publication. Conversely, the second type, lacking the characteristics of an original intellectual contribution, does not warrant authorship or scientific recognition.

Further inquiries examined whether respondents' research involved a stage concerning a research thesis or hypothesis. If the response to this initial question was affirmative, the survey

probed how respondents identify scientific ideas, research hypotheses, and research concepts. It's important to note that the Code of Ethics acknowledges this type of contribution to a project as an independent, significant, and creatively intellectual contribution, which inherently entitles its author to scientific authorship and publication credit.

Consequently, in response to the question, "Does the creator of the scientific idea (hypothesis) or research concept used in a specific research project typically gain the status of co-author of the resulting scientific publication(s)?", the answer is yes. For the question, "Is, and if so, in what way, the contribution to the research by the originator of the scientific idea (hypothesis) or research concept used in a specific research project recognized when the originator does not actively participate in the research process implementing their idea (hypothesis) or concept?", the answer is: "The originator is credited as a co-author of the scientific publication".

The subsequent questions address two main issues: firstly, whether specialized measurement apparatus (whether commercially available or not) and/or other research tools such as statistical analysis, chemometric analysis, and numerical methods are utilized in the respondent's research. Secondly, how such contributions to the scientific project are acknowledged when the research results are published.

Following ethical standards, an appropriate response to the second question, in cases where such methods or techniques are employed in the respondent's research, should clarify that the individual who provides only the research tool to the research team does not automatically gain the right to be recognized as an author of the scientific publication. However, acknowledgements for the provision of equipment should be included in the publication.

Subsequent questions delved into the issue of authorship rights concerning the creator of research results, specifically the individual responsible for obtaining the scientific data during the measurement process. In accordance with ethical standards of scientific authorship, the authors of the questionnaire posited that authorship rights are only granted if the creator of raw scientific data (without accompanying analysis or discussion) acquired these data through personalized and innovative human research activities. This may involve the use of specialized research methods/techniques utilizing equipment or software not commercially available.

Consequently, the correct answer to the question: "How is the contribution to the research typically acknowledged for a provider of 'raw scientific data' used in the scientific publication (i.e., provided without analysis or preparation of a respective section of the scientific publication), obtained through individualized and creative human research activities (e.g., with the involvement of specialist research methods/techniques using commercially unavailable equipment or software)?" is option (b), which states: "It is acknowledged by including the provider in the list of co-authors of the scientific publication."

For the question: "How is the contribution to the research typically acknowledged for a provider of 'raw scientific data' used in the scientific publication (i.e., provided without analysis or preparation of a respective section of the scientific

publication), obtained through routine and repetitive activities (e.g., specialist research techniques/methods using commercially available and routinely operated equipment or software)?" the correct answer is option (c), which states: "It is acknowledged by including respective acknowledgments in the publication, specifying the nature and significance of that contribution to the published research results."

There are questions pertaining to the provider of scientific data who, as a contribution to the research project, furnishes the team with the data along with their analysis, discussion of results, and drawing relevant conclusions. In response to the question regarding how to acknowledge the research contribution of the "provider of processed scientific data" used in the scientific publication (i.e., provider of raw data delivered along with their analysis or preparation of a respective section of the scientific publication), obtained using specialized techniques/methods (e.g., specialized equipment or software), the correct answer is option (b), which states: "It is acknowledged by including the provider on the list of co-authors of the scientific publication."

The author of such a contribution to the scientific project and publication meets the criteria of scientific authorship according to ethical standards, as well as from a copyright perspective. From an IPR standpoint, it should be recognized as a contribution work to a future multi-author scientific publication.

The final question of the first section of the survey delved into the practices of recognizing the nature of contributions to a specific scientific project by the provider of a commercially unavailable research object (e.g., the creator of a synthesized material such as a chemical compound, polymer, ionic liquid, or nanomaterial). The correct answer to this question is option (b): "It is acknowledged by inclusion in the list of co-authors of the scientific publication."

It's important to clarify that the creator of a commercially unavailable research object makes an independent, significant, and original contribution to the research, which further influences the feasibility of the research project. Thus, their scientific authorship is justified under the code of ethics for scientists.

Considering researchers as a "profession in which the public reposes confidence," we identify significant and statistically substantial differences in the pragmatic approach towards fundamental ethical aspects related to intellectual property rights. To ascertain whether there exists a statistically significant correlation between responses to questions and various respondent groups, we employ the chi-squared test. We consider the dependence between answers to questions for different groups of respondents to be statistically significant if indicated by a p-value < 0.05 for the chi-squared test.

TABLE 1. RESULTS (POLISH LANGUAGE VERSION OF THE SURVEY) OF THE CHI-SQUARED TEST FOR THE GROUP I QUESTIONS (CF. APPENDIX) VERSUS RESPONDENTS GROUPS LABELLED AS 0.X FOR X=1,2,3. NUMBER 1 IN THE TABLE INDICATES STATISTICALLY SIGNIFICANT DEPENDENCE INDICATED BY THE P-VALUE < 0.05 OF THE CORRESPONDING CHI-SQUARED TEST.

	I.1	I.2	I.3	I.4	I.5	I.6	I.7
0.1	0	0	0	0	0	0	1
0.2	0	0	0	0	0	1	0
0.3	0	0	0	0	0	1	1

TABLE 2. RESULTS (POLISH LANGUAGE VERSION OF THE SURVEY) OF THE CHI-SQUARED TEST FOR THE GROUP II QUESTIONS (CF. APPENDIX) VERSUS RESPONDENTS GROUPS LABELLED AS 0.X FOR X=1,2,3. NUMBER 1 IN THE TABLE INDICATES STATISTICALLY SIGNIFICANT DEPENDENCE INDICATED BY THE P-VALUE<0.05 OF THE CORRESPONDING CHI-SQUARED TEST.

	II.1	II.2	II.3
0.1	1	0	0
0.2	0	1	0
0.3	0	1	0

TABLE 3. RESULTS (POLISH LANGUAGE VERSION OF THE SURVEY) OF THE CHI-SQUARED TEST FOR THE GROUP III QUESTIONS (CF. APPENDIX) VERSUS RESPONDENTS GROUPS LABELLED AS 0.X FOR X=1,2,3. NUMBER 1 IN THE TABLE INDICATES STATISTICALLY SIGNIFICANT DEPENDENCE INDICATED BY THE P-VALUE<0.05 OF THE CORRESPONDING CHI-SQUARED TEST.

	III.1	III.2	III.3	III.4
0.1	0	0	0	0
0.2	1	0	1	1
0.3	1	1	1	1

TABLE 4. RESULTS (ENGLISH LANGUAGE VERSION OF THE SURVEY) OF THE CHI-SQUARED TEST FOR THE GROUP III QUESTIONS (CF. APPENDIX) VERSUS RESPONDENTS GROUPS LABELLED AS 0.X FOR X=1,2,3. NUMBER 1 IN THE TABLE INDICATES STATISTICALLY SIGNIFICANT DEPENDENCE INDICATED BY THE P-VALUE<0.05 OF THE CORRESPONDING CHI-SQUARED TEST.

	III.1	III.2	III.3	III.4
0.1	0	0	0	0
0.2	1	1	0	0
0.3	1	1	0	0

We categorize responses based on respondents' sex (0.1), age (0.3), and scientific experience (0.2), qualified by their degree title. The chi-squared analysis results are summarized in Tables 1-4 for questions in the I, II, and III groups, respectively (refer to the Appendix).

A notable finding is the absence of statistically significant dependence for English-language respondents answering questions from the I and II groups concerning the categories 0.1, 0.2, and 0.3. In simpler terms, Tables 1 and 2 for English-language surveys (not provided here) show only zeros, indicating no statistically significant dependence on any of the categorizing characteristics, including sex, age, or degree.

Answers to the third group of questions (III), which pertain to ethical and legal rules governing scientific practice, warrant careful examination. Contrary to the previously discussed groups (I and II), the responses from both English-language and Polish-language respondents in this category exhibit statistically non-trivial dependencies on the considered categories (area, sex, and scientific experience), as juxtaposed in Tables 3 and 4 for Polish- and English-language respondents, respectively.

While 'ones' are more prevalent in Table 3 compared to Table 4, it is crucial to note that upon comparing the tables, a common dependence is evident for question III.1 ("*Do you know the copyright law provisions protecting the authorship of an intellectual contribution to research?*"), with respect to both scientific experience (0.2) and age of respondents (0.3). However, it's important to emphasize the differing nature of answers between English-language and Polish-language

respondents.

V. CONCLUSIONS FROM STATISTICAL ANALYSIS OF QUESTIONNAIRE RESULTS

Scientists or researchers embody a profession in which the public places its trust. However, this broad characterization necessitates specification based on the current conditions and objectives of scientific research conducted within a particular context, encompassing traditions, legal regulations, and historical background. Our investigations, conducted through the analysis of surveys (refer to the Appendix) in both English and Polish language versions, enable us to compare and contrast how scientists implement the most fundamental ethical and legal rules related to research contribution and authorship attribution.

We categorized respondents based on their sex, age, and scientific experience, indicated by their degree, and identified statistically significant dependencies that are common among the results of the Polish language questionnaires. Specifically, this type of dependence was entirely absent in English language responses to questions concerning research contribution (questions from group I, see Appendix) and authorship (questions from group II, see Appendix).

Responses to questions from group III, which pertain to knowledge of ethical and legal regulations, exhibited statistically significant dependencies on the selected categories for both groups of respondents, particularly for age and scientific experience. Comparing answers across different age groups leads to the conclusion that the differences between English and Polish language responses to the questionnaire may be related to historical background, especially for older scientists. It is more likely that scientists who completed the questionnaire in Polish experienced a political transition to a fully democratic system at some point in their educational curriculum and became subject to common regulations of the European Community.

It is noteworthy to emphasize that the absence of dependence on sex, age, or experience in understanding, applying, and accepting ethical and legal rules concerning authorship attribution and research contribution serves as a natural indication of the maturity of the scientific community. We provide statistically significant evidence indicating that there is still a distinction between the Western (or European) scientific community, represented by English-language respondents in our survey, and Polish-language respondents. However, this difference is not inherently linked to the development of science itself; rather, it is associated with the social and legal environment in which scientific endeavors take place.

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VIII. APPENDIX. SUPPORT MATERIAL FOR THE ANALYSIS OF STATISTICAL RESULTS

Below questions and possible answers of the questionnaire are presented. Applied numbering (0,I,II,III) correspond to the notation used in this work. Further details concerning the survey are available from the corresponding author upon reasonable request.

A. Questions

Categories:

- 0.1 Sex
- 0.2 Age
- 0.3 Academic title/degree

Research Contribution:

I.1 - Is the status of co-author of a scientific publication, in your area of expertise, assigned to every member of the research team being the author of an intellectual contribution to a specific scientific project regardless of whether the person has been responsible for preparing the manuscript or its specific part?

I.2 - Does the creator of the scientific idea (hypothesis) or research idea (concept) used in a specific research project customarily gain the status of co-author of the ensuing scientific publication(s)?

I.3 - Is, and if so, in what way, the contribution to the research by the originator of the scientific idea (hypothesis) or research idea (concept) used in a specific research project recognised when the originator does not take an active part in the research process implementing their idea (hypothesis) or concept?

I.4 - Does the holder of the scientific equipment shared with the research team to carry out specific tests (i.e. the equipment's holder does not perform any research activities in the project but only permits the use of the research equipment at their disposal), customarily gain, in your academic environment, the status of co-author of the scientific publication?:

I.5 - Is, in your area of expertise, the contribution to research of a provider of "raw scientific data" (i.e. provided without analysis or preparation of a respective fragment of the scientific publication) obtained through individualised and creative human research activities (e.g. implemented with the involvement of specialist research methods/techniques using commercially unavailable equipment or non-commercial software), that is non-routine activities (unlike, e.g., routine use of automated measuring apparatus), customarily treated as creative/intellectual contribution to the research?

I.6 - Is, in your area of expertise, the contribution to research of a provider of "raw scientific data" (i.e. provided without analysis or preparation of a respective fragment of the scientific publication) obtained through routine and repetitive activities (e.g. specialist research techniques/methods using commercially available and routinely/automatically operated equipment or software), customarily treated as creative/intellectual contribution to the research?

I.7 - How is the contribution to the research customarily marked of the provider of a commercially unavailable research object (e.g. creator of synthesis of the analysed material, e.g., chemical compound, polymer, ionic liquid, nanomaterial) for a specific scientific project?

Authorship Attribution:

II.1 - Does, in your academic environment and area of expertise, each person being the author of an actual, independent, creative and significant intellectual contribution to the research customarily become co-author of the scientific publication?

II.2 - Is there, in your academic environment and area of expertise, a phenomenon of honorary (guest) authorship, understood as inclusion on the list

of the publication's authors of persons who, in fact, have not participated in the research process: either in the preparation of the article or in the form of any actual, independent, creative and significant intellectual contribution to the research?

II.3 - Is there, in your academic environment and area of expertise, a phenomenon of including in a publication so-called acknowledgements to persons or institutions having influence on the research, but otherwise than through independent, creative and significant intellectual contribution to the research?

Legal and Ethical Rules:

III.1 - Do you know the copyright law provisions protecting the authorship of an intellectual contribution to research?

III.2 - Do you know the provisions of codes of conduct for scientists governing the issue of protecting the authorship of an intellectual contribution to a research and rules of attributing authorship to scientific works?

III.3 - Do you know the customs of attribution of authorship to scientific works, specifying the provisions of the codes of conduct for scientists, as established in your academic environment/area of expertise?

III.4 - What are the customs of attributing authorship to scientific works, specifying the provisions of the codes of conduct for scientists, as adopted in the scientific institution/research team where you currently carry out research?

B. Answers

0.1 - answers: ['Female' nan 'Male' 'Prefer not to say']

0.2 - answers: ['30-39' nan '70+' '40-49' '60-69' '50-59' '24-29']

0.3 - answers: ['Doctor' nan 'Professor' 'Doctor habilitatus' 'No academic title/degree applicable postgraduate' 'Master']

I.1 - answers: [nan 'No' 'Yes']

I.2 - answers: [nan 'Yes, if the originator of the research takes active part in the research process implementing their idea or concept' 'Yes' 'No']

I.3 - answers: [nan 'The originator is recognised by placing respective acknowledgements in the publication, describing the nature and significance of the contribution to the published research results']

'The originator gains the status of co-author of the scientific publication'

'Other' 'The originator is not formally recognised in any way']

I.4 - answers: [nan

'No, but acknowledgements for the sharing of equipment are included in the publication']

'Yes, for the mere sharing of equipment'

'No, never for the mere sharing of equipment']

I.5 - answers: [nan

'Yes, mere implementation of such tests and provision of "raw scientific data" is considered creative (as intellectual contribution to the research)']

'No, but acknowledgements are included in the publication for carrying out the test and provision of "raw scientific data"']

'No, mere implementation of such tests and provision of "raw scientific data" is never considered creative (as intellectual contribution to the research)']

I.6 - answers: [nan

'No, but acknowledgements are included in the publication for carrying out the test and provision of "raw scientific data"']

'Yes, mere implementation of such tests and provision of "raw scientific data" is considered creative (as intellectual contribution to the research)']

'No, mere implementation of such tests and provision of "raw scientific data" is never considered creative (as intellectual contribution to the research)']

I.7 - answers: [nan

'It is marked by including in the publication respective acknowledgements specifying the nature and significance of that contribution to the published research results']

'It is recognized by inclusion in the list of co-authors of the scientific publication']

'It is not formally recognized in any way, especially if the costs of the object's creation have been paid'

'Other']

II.1 - answers: [nan 'No' 'Yes']

II.2 - answers: [nan 'No' 'Yes, this is a common phenomenon'

'Yes, but it is a marginal phenomenon']

II.3 - answers: [nan

'Yes, acknowledgements are included, e.g., to the institution funding the research, persons providing assistance or advice in the research or preparation of the publication's manuscript, etc.']

'No']

III.1 -

answers: [nan 'Yes, I do. I learned about them by myself' 'No, I do not'

'Yes, I do. I learned about them from my employer']

III.2

answers: [nan 'Yes, I do. I learned about them by myself' 'No, I do not'

'Yes, I do. I learned about them from my employer']

III.3

answers: [nan 'Yes, I do. I learned about that by myself' 'No, I do not'

'Yes, I do. I was instructed about them by my scientific mentor (e.g. doctoral supervisor or another person managing research in my research team)']

III.4 answers: [nan

'They are similar to the customs I know from other research centres, including foreign ones'

'I do not know'

'They differ from the customs I know from other research centres, especially foreign ones']