

**ARTYKUŁY****Małgorzata Dzimińska**

Uniwersytet Łódzki

ORCID: <https://orcid.org/0000-0001-7998-8178>e-mail: [malgorzata.dziminska@uni.lodz.pl](mailto:malgorzata.dziminska@uni.lodz.pl)**Łukasz Grabowski**

Uniwersytet Opolski

ORCID: <https://orcid.org/0000-0002-3968-9218>e-mail: [lukasz@uni.opole.pl](mailto:lukasz@uni.opole.pl)**Aneta Krzewińska**

Uniwersytet Łódzki

ORCID: <https://orcid.org/0000-0001-5267-3600>e-mail: [aneta.krzewinska@uni.lodz.pl](mailto:aneta.krzewinska@uni.lodz.pl)**Izabela Warwas**

Uniwersytet Łódzki

ORCID: <https://orcid.org/0000-0001-8066-746X>e-mail: [izabela.warwas@uni.lodz.pl](mailto:izabela.warwas@uni.lodz.pl)**On the perception of science by Poles: corpus-based  
descriptive study of public consultation data\*****O postrzeganiu nauki przez Polaków: opisowe badanie korpusowe  
na materiale wywiadów przeprowadzonych  
podczas konsultacji społecznych****Abstract**

This descriptive study, conducted using corpus linguistic research methods, examines the ways the Polish public perceives science. Starting from selected assumptions of Critical Discourse Analysis and the Linguistic Picture of the World, whereby language is seen primarily as a social practice and as a carrier of knowledge, opinions, beliefs and attitudes, we analyse the data obtained during public consultations on science communication which were held in 2019 in Poland, as part of the CONCISE project. The combined quantitative and qualitative analyses focus on selected collocations of a high-frequency noun *nauka*

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(‘science’) and aim to identify patterns of reference and agency within the discourse. The findings revealed citizens’ expectations concerning science, including its clarity, accessibility, understandability, visibility and credibility.

**Keywords:** perception of science, science communication, society, public consultation, corpus linguistics

### Abstrakt

W niniejszym studium opisowym, przeprowadzonym z wykorzystaniem metod korpusowych, badamy postrzeganie nauki przez polską opinię publiczną. Opierając się na wybranych założeniach teoretycznych z zakresu krytycznej analizy dyskursu oraz językowego obrazu świata (JOS), gdzie język postrzegany jest przede wszystkim jako praktyka społeczna, a także jako nośnik wiedzy, opinii, przekonań i postaw, analizujemy dane pozyskane podczas konsultacji społecznych na temat komunikacji naukowej przeprowadzonych w 2019 r. w Polsce w ramach projektu CONCISE. Połączona analiza ilościowa i jakościowa skupia się na wybranych kolokacjach rzeczownika o wysokiej częstotliwości występowania w tekście (*nauka*), a jej celem jest określenie wzorców referencji i agentywności w dyskursie. Wyniki badania uwypukliły oczekiwania obywateli wobec nauki, w tym takich jej atrybutów, jak klarowność, dostępność, zrozumiałość, widoczność i wiarygodność.

**Słowa kluczowe:** postrzeganie nauki, komunikacja naukowa, społeczeństwo, konsultacje społeczne, lingwistyka korpusowa

## Introduction

There is no consensus among researchers of various disciplines (philosophy of science, methodology, sociology of science, logic, history of science etc.) as to a single, comprehensive and unambiguous definition of science (Chalmers 1976). In fact, scientific knowledge can be characterised in many different ways, e.g., by contrasting it with day-to-day, common-sense knowledge (Lutyński 1994; Nagel 1961) or by exploring differences between science, non-science or pseudoscience (Ziman 1968; Lacatos 1973; Mahner 2007). Also, Ajdukiewicz (1975) argues that science should be identified either with activities performed by scientists – then it is considered as a craft (Ravetz 1996) – or with the effects of scientists’ work, i.e., theories, classifications, theorems, research reports, articles, scientific books, etc. Other definitions (e.g. Ossowski 1967) focus only on the activities undertaken by scientists or on the science itself seen from multiple perspectives: historical (emphasising the development of individual scientific disciplines or changes in the roles of researchers over time), organisational (focusing on the ways universities and research institutes are organised as well as on government policy in relation to science), psychological (focusing on the different stages of scientific creativity or skills required to pursue research in a particular

field), sociological (exploring the relationship between science and other aspects of social, economic, political and cultural life) and philosophical (examining the concept of science, classification of sciences etc.).

The very multiplicity of definitions of science goes hand in hand with varying public perception and understanding of science. Hurtado and Cerezo (2012) discuss substantial changes in the public's relation to science, including its assimilation, using the model called "Stairway of scientific culture". It consists of many levels ranging from the expression of interest in scientific matters, the relevance attributed to science in terms of personal utility to dispositions to participate in science (Hurtado, Cerezo 2012). Thus, we can observe the evolution in public understanding of science, that is, from considering it as an exceptional and distant concept to a research process that can be accompanied or co-created by non-professionals. This makes the concept of science more familiar and accessible to the public. Noy and O'Brian (2019) show that experiences and identities translate into attitudes about science. The level of education is associated with greater appreciation of science cross-nationally. This relationship is amplified in countries with high levels of public participation in scientific activities and attenuated in countries with lower public participation, where the scepticism towards science among certain groups of people is more visible (Noy, O'Brian 2019). There is also ample research showing that different definitions of science correlate with multiple social variables. For example, a review of studies by Schafer et al. (2019) showed that certain population subgroups differ in their perceptions of science, and these differences are related to place of residence (urban-rural), education level, research fields, sex, age, religion etc. Bauer (2009) also claims that the public understanding of science varies across countries (an industrial-developing contexts versus a knowledge-intensive developed context), and the interest in science fluctuates from generation to generation. Sturgis and Allum (2004) argue that a negative stance towards science is oftentimes rooted in ignorance and misunderstanding of science as well as in fear of its potential risks. In our study, we will attempt to examine whether any of these aspects related to the perception of science emerge from the public consultation data under scrutiny.

Furthermore, there has been research galore conducted so far on the factors that influence the perception of science and scientists by the public. For example, the citizens' perceptions of science can be related to the specificity of media systems in a given country: Hamellers et al. (2021) identified two main clusters, namely Western and Northern European, as well as Eastern and Southern European, where in the latter the distinction between perceived inaccurate news reporting (misinformation) and perceptions of biased and

dishonest media reporting (disinformation) is less clear-cut. The perception of science can be also consistent with general value systems and social roles: power elites place more emphasis on the social importance of science and have more trust in scientific knowledge, as exemplified by the Croatian public (Prpić 2011). The Spanish public, in turn, believes that scientists may be influenced by economic interests in their work (Lujan, Todt 2007).

The results of the latest surveys conducted in Poland in 2021 as part of “The State of Science Index”<sup>1</sup> show that respondents considered science as important in their everyday life (91%), and as important for their family and society in general (92%). Scientists are trusted by as many as 83% of the respondents. Only 14% said that science had never had any impact on their everyday life. When asked about how they felt about the role that science would play in their lives in 2021, three-quarters confirmed that they were “hopeful”. The majority of Poles (86%) either completely or somewhat agreed with the statement that “science gives me hope for the future”. The Poles also expressed their interest in hearing more from scientists about their work (78%), and they perceive science and scientific achievements as strong contributors to positive changes. More precisely, they believe that science and technology will have a positive impact on health and medical care (59%), protection of the environment (55%), fight against climate change (51%), and availability and quality of food (49%)<sup>2</sup>. All these results show that science is perceived by Poles as important and impactful.

In this study, we examine the perception of science as expressed by the Polish citizens during public consultations on science communication. Using quantitative and qualitative methods offered by corpus linguistics, we analysed the interviews with a sample of Polish respondents of various backgrounds, who expressed their opinion about four socially important scientific topics. The public consultations provided a robust set of data that can be analysed in order to better understand the Polish citizen’s perceptions of science. More precisely, we aim to examine the patterns of discursive representation of science in terms of naming and reference as well as agency

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<sup>1</sup> The State of Science Index is a survey on citizens’ attitudes towards science and the impact of science itself which has been conducted since 2017 by 3M. The last study was held in February/March 2021 among a representative sample of 1,000 adults per country (aged 18 and over) from such countries as USA, Canada, UK, Germany, France, Poland, Italy, Brazil, Mexico, Columbia, Japan, Singapore, South Korea, China, India, UAE, and Australia. The confidence level is 95%, the margin of error for all countries is +/- 0.75 percentage points and +/- 3.1 percentage points for each country.

<sup>2</sup> The negative impact was declared by fewer respondents (6%–12%) showing that there is more optimism than scepticism regarding the impact of science and technology on people’s lives.

and verify whether the discursual representation is positive or negative in tone. We believe that this paper will provide, first, valuable insights into the perceptions of science by the Polish citizens and, second, useful data for further studies in fields such as sociology, science communication, behavioural economics, higher education management or linguistics. We also hope that our findings will provide valuable input for various stakeholders interested in narrowing the gap between science and society.

## 2. Methodology

### 2.1. Research material

The research material used in this study was collected throughout the CONCISE<sup>3</sup> project, whose main goal was to investigate the role of science communication in shaping the knowledge, opinions and beliefs of EU citizens on issues directly related to science (<https://concise-h2020.eu/>). This was done through debates, in the form of public consultations, on science communication conducted in five European countries: Poland, Spain, Italy, Portugal and Slovakia. The CONCISE project methodology was based on the World Wide Views method (Worthington et al. 2011), which was adapted to research on science communication (Llorente et al. 2022). In this study, we used the data collected during the Polish public consultation organised on 21 September 2019 in Łódź. The respondents represented a variety of backgrounds and were carefully selected to assure an inclusive representation in terms of gender (63% female, 37% male), age (18 to 34 years old 30%, 35 to 49 years old 25%, 50 to 64 years old 26%, 65+ years old 19%), education level (primary education 8%, secondary education 44%, university education 48%), place of residence (rural 20%, urban 80%), disability (2%) or minority (2%) groups. One hundred participants were divided into 12 groups, mostly homogeneous with respect to age and education level. This arrangement resulted in creating such group dynamics where people felt willing to speak up and share their opinions. The whole meeting was divided into four rounds corresponding to four topics discussed by the participants under the guidance of special facilitators. The discussed topics included vaccines,

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<sup>3</sup> The project CONCISE – Communication role on perception and beliefs of EU citizens about science, from which we obtained the research material for this study, was carried out between 2018 and 2021. In short, the project goals included identification, description, and verification of sources of scientific knowledge for the wider public, and collection of suggestions for improvement of science communication.

climate change, genetically modified organisms and alternative medicine (Krzewińska et al. 2021). Regardless of the topic, each round of consultations was structured in a similar way: the respondents began by listing the sources from which they draw their knowledge on a given topic, then assessed their level of confidence in those sources, and finally presented their own ideas on how scientific messages should be produced and communicated to reach a wide audience. The facilitators took care about the good atmosphere of the discussion, adherence to discussion rules, and they made sure that all the planned threads in each round were discussed. All group discussions were audio recorded, subject to the participants' prior agreement. Overall, we obtained 96 hours of recordings, which were then transcribed (Warwas et al. 2021). The transcriptions were saved as plain text files, with 209,702 words in the whole study corpus, and uploaded into SketchEngine software (Kilgarriff et al. 2014) custom-designed for text analysis.

## 2.2. Methodological framework

In our study, based on the considerations of Ajdukiewicz (1975), we analysed the concept of science (*nauka* 'science') and its attributions as perceived by the respondents.

Thus, we explore the concept of **science** in terms of its discursive representation, which is a linguistic representation of reality, also known as The Linguistic Picture of the World (*językowy obraz świata*, JOS), that is, a collection of judgments and evaluations of people, artefacts, events or phenomena that make up a subjective interpretation of the world recorded in language (texts) (Bartmiński 2010: 56, also cited in Kopytowska, Grabowski 2017: 91). This approach corresponds with the research paradigm known as discourse studies, which involves the “analyses of linguistic behaviour, written and spoken, beyond the limits of individual sentences, focusing primarily on the meaning constructed and interpreted as language used in particular social contexts” (Bhatia et al. 2008: 1). Our analysis is also in line with one of the main assumptions in Critical Discourse Analysis (CDA) research paradigm whereby language is seen as a “social practice” and discourse is seen as both socially-constituted and socially-constitutive (Fairclough, Wodak 1997; Wodak, Meyer 2009). Hence, we believe that the linguistic and discursive representation – as recorded in the interviews, that is, in the respondents' opinions, beliefs judgments and evaluations – has the potential to reinforce the image of science or, to put it mildly, that it represents and mirrors a popular image and perception of science.

### 2.3. Research questions, tools, units of analysis and study stages

Focusing on exploration of discourse representation of *science* and conducted using corpus linguistic methods, our study aims to provide answers to the following research questions:

- 1) What is the Polish respondents' perception of science?
- 2) What are the patterns of discoursal representation of science in terms of naming and reference as well as agency?

In order to identify any patterns within discursive representation, we used a custom-designed program for text analysis SketchEngine (Kilgarriff et al. 2014). This tool enabled us to generate so-called wordsketches of the Polish noun *nauka* 'science', and then study its word co-occurrence patterns. Such a procedure allows combining the methods typical of corpus linguistics (e.g. collocation and concordance analysis) with Critical Discourse Analysis, as exemplified by Baker et al. (2008) in their study of discourses of refugees and asylum seekers. A similar approach to the one employed in the present study was also used by Kopytowska and Grabowski (2017) as well as Kopytowska et al. (2017) in research on hate speech targeted at immigrants. In short, the wordsketches present a summary of the collocational and colligational behaviour of words, and since our study corpus was uploaded into the SketchEngine software, tagged and parsed, it has been possible to explore cross-associations between the words and describe the meanings that emerge from these word combinations. By looking into the patterns of reference and agency, we aimed to verify what attributes and actions are assigned to the key concept selected in our research, namely how science is perceived and what role it plays – according to the respondents – in Polish society.

We will analyse, first, adjectival modifiers of the noun (*nauka* 'science'), and, second, verb phrases, where the said noun was used in a subject or object position, which will provide a starting point for more in-depth qualitative analyses. In total, the noun *nauka* occurs in the study corpus 127 times, yet for the sake of clarity we present in tables only the top-10 collocates in each position. In the case of even fewer collocates (when the value of a word association metric is low), we leave the corresponding rows empty. Although the frequency information is provided in the tables (with wordsketches that summarise three selected lexical and grammatical patterns of the noun *nauka*), the collocates are sorted according to LogDice<sup>4</sup>, which is used

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<sup>4</sup> For a more detailed explanation of LogDice and other word association metrics, see Rychly (2008) or visit the SketchEngine website at: <https://www.sketchengine.eu/blog/most-frequent-or-most-typical-collocations/>

in SketchEngine as an association metric that expresses “the typicality of the collocation” (Rychly 2008; Kilgarriff et al. 2014). Although some of the typical collocates identified with the said metric occur with low frequencies (e.g., 2 or 1), which is mainly due to a small size of the study corpus, they overall account for important data points in our attempt to reconstruct the discursual representation of science as perceived by the Polish respondents. In other words, the typicality of word combinations means that the LogDice metric identifies those adjectives or verbs that ‘specialise’ in combining with the noun *nauka* in our research material. Using the LogDice metric, we prioritise salient collocations, which are highly informative for us in that they reveal various qualities and attributes of science (they are not very frequent, though), rather than the most frequent ones, which often include combinations of content words and function words. Thus, the obtained salient word co-occurrence patterns are used as a starting point to qualitatively explore the use of the noun *nauka* – in terms of patterns of reference and agency – in its semantic and pragmatic contexts found in the nearest co-text. This allowed us to gain insights into the perception of science in the eyes of Polish respondents based on the discursual representation of the concept.

### 3. Empirical part

First, as we aim to explore how *science* is perceived by the Polish interviewees, we analyse word co-occurrence patterns of the noun *nauka* ‘science’, whose three selected lexical and grammatical associations are summarised in Table 1.

**Table 1.** The noun *nauka* ‘science’ and its collocates (top-10)

	Modifiers in attributive position	Freq.	Verbs with the noun in subject position	Freq.	Verbs with the noun in object position	Freq.
1.	<i>oficjalna</i> ‘official’	1	<i>zajmować</i> ‘deal (with)’	4	<i>podpierać się</i> ‘support with’	1
2.	<i>czysta</i> ‘pure’	1	<i>dyskryminować</i> ‘discriminate’	1	<i>wspomnieć</i> ‘mention’	1
3.	<i>cała</i> ‘entire’	1	<i>ewoluować</i> ‘evolve’	1	<i>bać się</i> ‘fear’	1
4.	<i>wszelka</i> ‘all’	1	<i>potrafić</i> ‘be able to’	1	<i>interesować się</i> ‘interest’	2
5.			<i>iść</i> ‘go’	1	<i>zajmować</i> ‘deal (with)’	2
6.			<i>brać</i> ‘take’	1	<i>działać</i> ‘act’	1
7.					<i>iść</i> ‘go’	1



The adjectives referring to science point to its overall contribution to humanity and society: *cała* ‘entire’, *wszelka* ‘all’. When described as *czysta* (‘pure’), science is considered as an objective, transparent and unbiased endeavour. Conducting research can be supported by the culture of trust in science, which can bring more benefits than harm to society if conducted with methodological rigour and maximum objectivity. One of the participants provided an example of Japan, where the level of confidence in science is high, which translates into little room for negation of scientific achievements or development of conspiracy theories:

*u nas jest blokada, a na przykład w Japonii ludzie są jasno informowani, jakie produkty są genetycznie modyfikowane i dlaczego. W Japonii są do tego przyzwyczajeni, oni się nie boją nauki [...] Oni są inaczej uczeni o nauce od początku, że to nie jest ich wróg [...] To jest po prostu czysta nauka. Oni o tym wiedzą i myślą, że nikt im nie chce zaszkodzić [text ID:9937329351]* ‘In our country there is a blockade, and in Japan, for example, people are clearly informed about what products are genetically modified and why. In Japan they are used to it, they are not afraid of science [...] They are taught differently about science from the beginning, that it is not their enemy [...] It is just pure science. They know about it and they think that nobody wants to harm them’

For science to be ‘pure’ (*czysta*), it has to be based on a strict methodology allowing to produce valid and reliable findings. The participants emphasised that a methodological rigour cannot be compromised. When all the different steps of the research procedure are controlled, it is possible to discover cause-and-effect relationships and reach correct conclusions. The transparency of the procedure enables other scientists to replicate research studies and further verify their findings:

*nauka w ten sposób działa, [...] że przedstawia się jakieś dane, pokazuje się na podstawie czego są wyciągane wnioski i cała reszta naukowców może zweryfikować te wnioski czy właściwie są wyciągnięte, czy właściwa jest metodologia przedstawiona [text ID:2528325962]* ‘science works in such a way [...] that some data are presented, they are shown and conclusions are drawn from them, and the rest of scientists can verify these conclusions as to whether they are drawn correctly or whether the presented methodology is correct’

*nauka też się właśnie bierze z doświadczeń właśnie, o to chodzi, to jest ważne źródło nauki tak, ale doświadczeń naukowych prowadzonych w sposób rygorystyczny [...] badania naukowe między innymi na tym polegają, że jest dla nich przyjęta metodologia, na tej podstawie [...] możemy wyciągać pewne wnioski [text ID:8800986903]* ‘science also stems from experiments, that’s what it’s all about, it’s an important source of science, yes, but scientific experiments conducted in a rigorous manner [...] scientific research, among other things, is based on the fact that there is a methodology adopted for it, on the basis of which [...] we can draw certain conclusions’

Another collocate of the noun *nauka* is the verb *zajmować się* ‘deal with’. According to the respondents, science deals with discovering new relationships and patterns, conducting research and testing the course of various processes. At the same time, they believe that conducting research requires a certain degree of courage from scientists who sometimes choose a difficult path and “go against the grain”. In this scenario, science might question existing principles and current knowledge. It is precisely this kind of questioning of established patterns or accepted regularities that can lead to discoveries and innovations:

*właśnie na tym chyba polegają wszystkie badania i wszystkie prezentowane wyniki, żeby dojść jak najbliżej do tej prawdy i już weryfikować to, co już obecnie uważamy* [text ID: 2528325962] ‘I guess that’s what all research and presented results are about, to get as close to the truth as possible and to verify what we already think’

*to, co jest napisane w podręczniku stało się prawdą objawioną, nikt nie ma z państwa odwagi poszukiwać tej prawdziwej prawdy, tej która gdzieś tam jest niespójna z linią aktualnie obowiązującą w świecie nauki* [text ID: 11598419985] ‘what is written in the textbook has become the received truth, none of you has the courage to search for this real truth, the one that is somewhere inconsistent with the line currently valid in the world of science’

The respondents refer to the developmental nature of science and the fact that it advances continuously. It is highlighted by the use of the verbs *rozвивać się* ‘evolve’ or *iść z postępem* ‘keep up with progress’. It seems obvious to the respondents that science is up-to-date at a certain point in time only, but as it advances, it brings new findings, thus constantly fueling progress and updating our state-of-the-art of knowledge:

*nauka jednak ewoluuje i chyba jednak nikt nie ma takiej wiary, że obecna wizja na klimat jest ostateczną i jedyną właściwą* [text ID: 2528325962] ‘However, science is evolving, and I don’t think anyone believes that the current vision on climate is the final and only correct one’

The data also revealed that the respondents’ attitudes towards science are not clear-cut. On the one hand, they fear science (*bać się* ‘fear’). This feeling can be caused by a number of different factors, for example, the lack of understanding of science or the lack of skills to conduct it with confidence. On the other hand, science is of interest to the study participants (*interesować się* ‘interest’). As active citizens, they are interested in science as it has an impact on them, and therefore they are willing to learn new things and gain useful insights:

*ja sobie zrobiłem taki swój świat, że tak powiem, na facebooku po prostu obserwuję takie rzeczy, które mnie interesują* [text ID: 6997976121] ‘I have created my own world, so to speak, on Facebook, simply by observing things that interest me’

Using the verb *podpierać się* ‘support with’, the participants appreciate the fact that the use of science helps validate information. Sometimes the excess of information and contradicting news may cause difficulty to form an opinion. In such cases, verifying the information against reliable scientific sources may help avoid confusion. Also, science is no longer perceived as official (*oficjalna*) as it appears more often in mass media and social media and thereby spreads through society also informally:

*preferuję kanały i ludzi, którzy wspierają się nauką i w opisie [...] podają źródła* [text ID: 11800291455] ‘I prefer channels and people who support [their claims] with science and give sources in the [...] description’

However, the use of scientific sources is far from straightforward because there is a level of complexity associated with them (e.g. inaccessible academic language), and certain effort is required to reach out for science:

*też właśnie wychodzę z założenia, że najlepiej jest sięgać po najmniej przetworzone informacje, tutaj najwięcej wiarygodności znajdziemy, aczkolwiek [...] ciężko jest się spodziewać, że ludzie będą sięgać po takie informacje, jak publikacje naukowe, które mogą po prostu odstraszać od całego tematu* [text ID: 8078460387] ‘I also assume that it is best to go for the least processed information, this is where you will find the most credibility, however [...] it is hard to expect people to go for information such as scientific publications, which can simply scare off the whole subject’

The respondents also drew their attention to possible misrepresentations of scientific facts due to faulty editorial work or wrong translations of source texts. The misinterpretation and overgeneralization of scientific facts poses another threat to the proper use of science. The participants also noted that science can be entangled in business relations or be subjected to politically motivated manipulation, which is all due to commercial and economic interests. In such circumstances, research results can be tailored to the expectations and assumptions of patronage, that is, research funding institutions (funding agencies, business entities etc.):

*[...] nauka, z którą związane są różne korporacje finansujące różne badania, którym jest na rękę, żeby wykazać, że węgiel na przykład nie wpływa [...] a inni z kolei wykażą, że wręcz przeciwnie. To wszystko zależy od tego, kto finansuje badania* [text ID:10089677199] [...] science, which is associated with various corporations that finance various studies, and it may be beneficial for them to show that coal, for example, does not affect [...] and others will show the opposite. It all depends on who is funding the research’

*zdajecie sobie z tego sprawę, że badania są sponsorowane i często jakby te zmienne statystyczne, którymi się posługują w badaniach naukowcy są też dobierane* [text ID:6280115649] ‘you do realize that research is sponsored, and often it’s like these statistical variables that scientists use in research are also selected’

The data also revealed that the study participants personalised science by relating it to verbs such as *dyskryminować* ‘discriminate’. They claim, for example, that science does not discriminate against gender because sound scientific findings defend themselves:

*jeśli dwóch profesorów rozmawia, kobieta i mężczyzna, i zachowujemy to, że mają tę samą wiedzę, to chyba płęć nie ma znaczenia [...] dla mnie bez różnicy, dlatego jak widzę osobę, która jest wyuczona, wie na jaki temat się wypowiada, dla mnie nie ma znaczenia, czy to jest kobieta i mężczyzna. Tak samo nauka nie dyskryminuje [text ID:8800986903] ‘if two professors are talking, a woman and a man, and we remember the fact that they have the same knowledge, then I guess gender doesn’t matter [...] for me it makes no difference, that’s why when I see a person who is educated, who knows what he or she is talking about, for me it doesn’t matter if it’s a man or a woman. In the same way science does not discriminate’*

Science is also perceived as solid grounding, something to rely on in moments of uncertainty. But at the same time, the participants underline that science has its limitations. It ‘is capable of’ (*potrafi*) providing arguments and directions, but it cannot answer all the questions or set priorities as to what is important and what is not:

*Wiemy, że nic nie wiemy. Nauka mimo całego tego postępu albo nie jest w stanie określić co jest przyczyną, albo określa, a mimo wszystko wprowadza ludzkość w błąd, mówiąc zupełnie o innych sprawach, niż należałoby [text ID:3264809120] ‘We know that we know nothing. Science, despite all this progress, is either unable to determine what the cause is, or it determines it and yet misleads humanity by talking about completely different things than it should do’*

The respondents further argue that science has a moral responsibility to use scientific inventions with caution, as some of them can be potentially harmful for humanity:

*Nauka jak każda dziedzina życia ponosi odpowiedzialność moralną za swoje wynalazki. Tak, jak można niemoralnie korzystać z wielu wynalazków nauki, tak jak wiemy, że niemoralne jest wykorzystywać proch strzelniczy do zabijania czy wspomniany już atom i rozpad radioaktywny do zabijania, tak całkiem moralne jest wykorzystanie tego do górnictwa czy do pozyskiwania energii. [text ID:12632607207] ‘Science, like any field of life, has a moral responsibility for its inventions. Just as it can be immoral to use many inventions of science, just as we know that it is immoral to use gunpowder to kill or the already mentioned atom and radioactive decay to kill, it is quite moral to use it for mining or energy extraction’*

Finally, the participants underscore that science has the moral mission to combat lies, because ‘a lie repeated a thousand times will eventually become a fact’ (*kłamstwo powtarzane tysiąc razy stanie się w końcu faktem*) [text ID: 11598419985], an opinion which emphasises high hopes, expectations and values that science is attributed with by the society at large.

## 4. Discussion and conclusions

On the one hand, the study results revealed that the Polish respondents perceive science as something distant, difficult to reach or understand in its purest form. On the other hand, they express interest in the new scientific findings and recognize the need to befriend science and use it for the benefit of society. It was also revealed that the Polish public personalises science and attributes moral responsibilities to it. In the face of information overload and uncertainty, the respondents consider using science as a basis for their decision-making. They point out that science should be based on rigorous methodology. It also needs to be unbiased and transparent in terms of funding to avoid any conflict of interests. The identified collocates including ‘pure science’, ‘deal with science’, ‘interest’, ‘fear’, ‘support with science’ reveal the salient aspects of science as seen by the respondents. Overall, the respondents’ expectations are strictly connected to the objectives of science communication (cf. Kappel, Holmen 2019; Calsamiglia, Van Dijk 2004), in particular in terms of improving the people’s beliefs about science, developing social acceptance as well as building epistemic and moral trust in science. According to the respondents, science goes beyond developing knowledge in a given field of study: it is also seen as a means of protection from pseudoscience, fake news and falsehood found in mass media (cf. Lewandowsky et al. 2017).

The qualitative concordance analysis of the noun *nauka* (‘science’) shed light on some common themes (i.e., financial transparency, methodological rigour, need for dissemination). At the same time, the analysis allowed us to reveal the citizens’ expectations from science and its creators in terms of their credibility, visibility, accessibility and understandability. All this builds a comprehensive picture of science as important, useful and impactful. These findings correspond with the results of surveys on trust in scientists (Omyła-Rudzka 2019) as well as on trust in science and scientific messages (3M, 2021) conducted in recent years.

This study has a number of limitations, though. First, the results of qualitative research, due to the purposeful selection of respondents, may not be generalizable to the entire population of Poland. Thus, the list of constraints related to getting scientific content to a wider public may not be complete and fully comprehensive as it is contingent on and limited by the size and representativeness of the research material (the transcripts of public consultations held in Poland) and by the scope of corpus linguistic methodological procedures used in this study (collocation and concordance analysis). Second, the results exemplifying the patterns of naming, reference and agency with respect to science are also contingent on the units of analysis

(i.e., salient collocations with the selected key noun *nauka* ‘science’). It is entirely possible that the respondents also used other linguistic means (e.g., synonyms, paraphrases, pronouns) to refer to the key concept of science explored in this study.

There are many possible ways in which this study could be pursued further in the future. A more fine-grained analysis of the research material can be conducted to capture similarities and differences in the perception of science by groups separated by various social variables (place of residence, education level, age, gender, religion, political affiliations etc.), as suggested by Schafer et al. (2019). Next, more advanced corpus linguistic or machine learning methods, such as topic modelling (Blei 2012; Murakami et al. 2017), may be employed to identify hidden thematic structures in the respondents’ opinions. Finally, since trust in scientists and scientific findings may change over time due to various external factors (e.g., COVID-19 pandemic), a study like this one should be repeated in the future to capture the dynamic character of the role and perception of science (and the scientific community as a whole) by a wider public in Poland and beyond.

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