STEREOTYPES ABOUT RESEARCHERS BASED ON INTERNATIONAL AND HUNGARIAN SURVEYS

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ABSTRACT

How does the public, especially young people, perceive researchers? According to international research, this image is rather superficial. While there are positive elements, such as researchers being smart, diligent, and dedicated, there are just as many negative elements: they live only for their work, struggle in the real world, are introverted figures, and often their appearance is peculiar, giving the impression of a mad scientist. As revealed in the study, focus group primary research conducted also showed that the general image of researchers in Hungary is similar, further compounded by the respondents' belief that researchers often work for relatively low pay, thus being seen as "smart fools." Efforts should be made to shape and dismantle these stereotypes and highlight more positive attributes about researchers to improve public recognition.

KEYWORDS

researcher, science communication, image, perception, stereotype, appearance, focus groups, European Union, Researchers' Night

INTRODUCTION

Scientific research has always played a significant role in the advancement of the world, serving as a driving force behind it (European Commission, 2021a). However, these researches often do not receive the recognition they deserve from the public, and a rather stereotyped image of scientific researchers has developed (Tintori & Palomba, 2017).

These stereotypes do have positive elements, suggesting that researchers are not only smart and intelligent but also diligent and dedicated individuals whose work means everything to them. They are seen as reliable and honest, working for the betterment of people. However, there are just as many negative stereotypical elements: because they live only for their work, they struggle in the real world, are socially isolated, and lack friends and family. They are seen as poor communicators, not only peculiar and self-absorbed but sometimes with a neglected appearance, giving off the impression of a "mad scientist." Another common criticism is that they do not truly work for the good of the world but are driven by personal interests and can sometimes be quite arrogant (Tintori & Palomba, 2017).

This superficial image is so prevalent that the European Commission has been committed to improving public recognition of researchers and their work for nearly two decades. One of the main tools for this is the Researchers' Night, which aims to bring researchers closer to the general public to enhance their crucial role in society and especially in the everyday lives of citizens (European Commission, 2007). Moreover, the calls for

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Researchers' Night often explicitly mention the stereotypes about researchers and how they can be positively shaped or, if necessary, refuted.

This study aims to provide assistance in this regard. First, it presents the stereotypes associated with scientific researchers based on international literature and the possible basis for their formation. Then, relying on the results of a primary research study, it details how Hungarian university students perceive the typical researcher and what associations they attribute to them. In this context, a focus group study was conducted among university students at four higher education institutions. Finally, the study offers some "how to do" suggestions on how to improve the stereotyped image of researchers using various tools.

STEREOTYPES ABOUT RESEARCHERS BASED ON LITERATURE

According to the Dictionary of Foreign Words, a stereotype is a superficially generalizing opinion, a set of negative, positive, or neutral ideas and prejudices (idegen-szavak.hu, 2023).

At first glance, superficial generalization might sound negative, but stereotypes are useful in many ways: they help us make sense of the complexity of the world. As Nobel laureate Kahneman notes, we have two modes of thinking: fast and slow (Kahneman, 2011). Since we can only dedicate limited attention to various activities, actions, tasks, or problems in our lives, stereotypes serve as automatic and quick responses to the complex world and intricate situations.

We can form stereotypes about many things, but we most commonly do so regarding social groups – and then we judge individuals belonging to these groups simplistically based on these stereotypes. It is important to add that stereotypes not only highlight but sometimes exaggerate the characteristics that distinguish a particular group from others (Tajfel, 1974). In this sense, they represent not only rigid belief systems but can also be irrational and incorrect. However, as the Dictionary of Foreign Words' definition emphasizes, a stereotype can be not only negative but also neutral or positive (idegen-szavak.hu, 2023).

Moreover, these can mix, as we see in the case of stereotypes related to scientific researchers. The positive characteristics often associated with them are that they are intelligent, smart, almost geniuses, and in addition, they are workaholics, committed, and even passionate about solving specific research problems.

However, this can immediately have a negative interpretation: they essentially live only for their work, feel comfortable in their scientific environment, possibly in their lab, but struggle outside of it. They are awkward and boring in social settings, and poor communicators. They do not form deep human relationships outside of their colleagues. They cannot truly relax or have fun. While their thinking excels in the academic world, they do not shine in solving daily problems, and sometimes even lack common sense. This "eccentric" behavior can, in extreme cases, turn into the "mad scientist" stereotype – someone narrow-mindedly obsessed with working on something they believe serves humanity's interests, but does not. (Tintori & Palomba, 2017).

According to the related Eurobarometer report published by the European Commission in 2021 ("What Europeans think about science and technology"), the following characteristics best describe scientists according to European citizens, with the level of agreement indicating how well each attribute describes them (European Commission, 2021a): intelligence (89%), reliability (68%), collaborative (66%), honesty (58%), knowing what is good for people (47%), altruism (40%), bad at communicating (38%), arrogance (28%), narrow mindedness (23%), immorality (16%).

But where does this stereotype come from? The same 2021 Eurobarometer report by the European Commission (2021a) showed that the main sources of information for European citizens are: 1) television (TV set or via the internet) (63%); 2) online social networks and blogs (29%); 3) radio, including podcasts (14%); 4) online encyclopedias e.g. Wikipedia (13%).

So, personal encounters are not among the top four sources, although they could be one of the ways for individuals to gain direct experience and not generalize based solely on what they see on TV and the internet. Unlike many other professions, such as doctors, pharmacists, or lawyers, the average person very rarely has the opportunity to meet a real, flesh-and-blood scientist. According to Deloitte's 2014 report, there were 1.63 million full-time researchers in the 28 EU countries at that time, making up less than 0.7 percent of the workforce. In other words, the average person has a relatively low chance of meeting them or having a scientist among their friends or neighbors (Deloitte Consulting, 2014). It is perhaps no coincidence that one of the goals of Researchers' Night is to create such encounters, to show that "scientists are people too" (Mazzitelli, 2019).

Therefore, the image of scientists is much more shaped by what is seen, heard, and read in the media, whether it is movies, TV series, computer games, newspapers, magazines, or even novels and literary works (Tintori & Palomba, 2017; Turney, 1998; Haynes, 2003).

The aforementioned narrow-minded, mad scientist who believes they are working for the benefit of humanity but actually creates something terrible is a common representation in films. Examples include the scientist who created Frankenstein or the fundamentally well-intentioned scientists in the Spider-Man movies who eventually go mad and turn evil.

A slightly more favorable portrayal in recent years involves two labels: "geek" and "nerd." The term "geek" describes someone with above-average intelligence who works or behaves in ways that deviate from the mainstream (Cross, 2005). "Nerd" is another term for eccentric individuals, but the depiction is similar: in films and series, they are typically portrayed as white males who are passionately, almost obsessively, involved in mathematics, computer science, technology, and science. However, in real life, they struggle socially, finding common ground only with those similar to themselves, while neglecting family, friends, and romantic relationships—thus exhibiting rather deviant behavior (Kendall, 1999; Bucholtz, 1999; Eglash, 2002; Woo, 2012; Quail, 2011). This is reinforced by the fact that geeks and nerds in films and series are not only constantly shown sitting in front of a computer but also typically exhibit the following physical characteristics: thin body, poor posture, thick black-rimmed glasses, pale face, messy or greasy hair, and an overall unattractive appearance (Mercier et al, 2006).

There are instances where scientists are portrayed as heroes and champions of science. Nisbet & Dudo (2013) provide examples such as Dr. Alan Grant in the Jurassic Park films, Spock in the 2009 version of Star Trek, and the NASA astronaut stranded on Mars in the movie The Martian. This list could also be complemented by Iron Man from the Avengers, or the emblematic main character of the Marvel Cinematic Universe (Papp-Váry, 2023).

Besides media, education also plays a significant role. It is largely due to this that scientists and researchers are often thought of as working alone and in isolation, following the example of the greatest figures like Isaac Newton, Albert Einstein, or Charles Darwin. In reality, however, they were more the exceptions, and even they did not work in complete solitude. There are many examples of researchers collaborating as early as the 17th century, and by the 21st century, most academic research has become predominantly collaborative, conducted jointly by several researchers (Barabási, 2005; Jones et al, 2008; Wuchty, 2007). Therefore, the

stereotype of the researcher working in an ivory tower is another that does not hold up well (Veszelszki, 2022; Nuyts, 2014).

The stereotype that scientific researchers are more likely to be men than women is much more grounded in reality. According to Deloitte's 2012 data, while women made up 59 percent of those with university degrees in the 28 EU countries at the time, only 18 percent of those in professorial or university teaching positions were women (Deloitte Consulting, 2014). This both results from and perpetuates the stereotype of the typical researcher being a man, specifically a white man in his forties (Tintori & Palomba, 2017).

In addition to media and education, the opinions of our family members, friends, and acquaintances also play a significant role in shaping our image of researchers. Whether we talk to them about it personally or read their social media posts, it can be said that in most cases, they reinforce the usual stereotypes when they post about scientific research or researchers. It is worth noting that they rarely post about such topics, and when they do, it is often in a humorous context, such as references to "British scientists".

Whether these stereotypes are true or perceived, it is certain that the image of scientific researchers significantly differs from that of average people. Both positive and negative images reinforce the notion for the average person that a scientific researcher is not "someone like us," but rather a member of an elite, omniscient, and privileged group that deviates from the norm (Long & Steinke, 1996; Nisbet et al, 2002).

From the above, it is evident that there are quite a few negative elements in the perception of scientific researchers. This image can be harmful in several ways. For example, when the governments of certain countries decide how much to support scientific research. Or when young people consider whether to pursue a scientific career. Or when the general public forms an opinion about the usefulness or uselessness of a particular piece of research (Tintori, & Palomba, 2017).

It is obvious that the self-assessment and self-image of the scientific community differ significantly from what the public perceives. However, let's be honest: often the researchers themselves reproduce the most conservative stereotypes, thereby participating in their maintenance and dissemination (Schummer & Spector, 2008).

One such stereotype is that researchers cannot speak about their work simply and understandably to the average person – and let's admit, this is often true. So much so that according to the relevant Eurobarometer survey by the European Commission (2021a), among the top 10 most important factors that citizens expect from scientists is that they communicate well. (Along with being open, ethical, and modest, for example.) Additionally, 51% of respondents believe that scientists do not spend enough time meeting people and explaining what they do.

But what is the picture like in Hungary? Do people here hold similar views about researchers and share the same stereotypes as mentioned above? We explored this question through our own primary research.

The topic is particularly interesting because, alongside Portugal (71%) and Lithuania (68%), Hungary (59%) is among the top three European Union countries where the most people agree that science and technology can solve any problem. Interestingly, the least convinced are the citizens of the Netherlands (27%), France (26%), and Germany (21%) (European Commission, 2021b).

As previously mentioned, certain characteristics best describe scientists according to European citizens. In the case of Hungary, the image seems less problematic: for instance, Hungarians are much less likely to say that scientists are characterized by arrogance (only 10%

vs. the EU-27 average of 28%) or immorality (9% vs. 16%). Hungarians also do not view scientists as particularly narrow-minded (17% vs. 23%).

Conversely, compared to the EU average, Hungarians have a more favorable view of those engaged in science. They are more likely to describe them as reliable (76% vs. 68%), collaborative (77% vs. 66%), honest (71% vs. 58%), know best what is good for people (57% vs. 49%), or altruistic (53% vs. 40%).

Moreover, Hungarian citizens do not generally believe that scientists are bad at communicating. While 21% of Hungarians think this, the same ratio is 39% across the 27 EU countries. However, it is also interesting that, alongside Cypriots, Hungarians are the most likely in the entire European Union to think that scientists have a power that makes them dangerous because of their knowledge (58% vs. 46%) (European Commission, 2021b).

Examining Hungary is also important due to the notable role and significance of science in the country. According to The Good Country Index (2023), drawing its conclusions from publicly available data from the United Nations and other international organizations, Hungary ranks 2nd among 169 countries worldwide (!) based on its global contribution in the field of science and technology. In compiling this ranking, factors considered relative to the country's GDP include the number of foreign students studying in the country, the export of scientific journals and publications, the number of international publications, the number of Nobel Prizes, and the number of patents (Papp-Váry, 2022). Based on these factors, it is conceivable that Hungary may soon rank first, as recently contributed two new Nobel laureates to the world.

Therefore, the significance and contribution of science are undeniably important in Hungary. However, the question remains whether the perception of scientific researchers here is different from that abroad, or if a similar stereotypical image emerges (Papp-Váry & Kovács, 2022).

METHODOLOGY OF THE PRIMARY RESEARCH

Various approaches were considered regarding the methodology. One possibility could have been to analyze how researchers are depicted in Hungarian movies and series. However, the number of domestic productions that could have been relevant seemed limited. Another option could have been a media analysis to examine how researchers are portrayed in printed press, magazines, newspapers, and online media. A unique example of this: searching for the phrase "Brit tudósok" ("British scientists" in Hungarian) yields over 50,000 results in Google's system.

In addition to the above, we found several exciting approaches. Mead and Métraux, who conducted the first and very influential study on stereotypes about scientists, identified stereotypes based on "positive" characteristics (such as smart, highly educated, diligent) and "negative" characteristics (such as boring, weird, awkward) (Mead & Métraux, 1957). This was further developed by Dikmenli (2010), who conducted a study among university students on stereotypes about scientists and science, where he used a free word association test. The words associated with scientists included both negative and positive descriptions and were categorized into different groups: personal characteristics, activities, workplaces, technological developments, and physical features.

Chambers (1983) developed another interesting methodology known as the "Draw-A-Scientist Test" (DAST). In this case, children and young people are asked to draw a scientist, and then the drawings are analyzed for the presence of the following stereotypical characteristics: laboratory coats, glasses, facial hair or distinctive hairstyles (e.g., beard, mustache, exceptionally long sideburns), research symbols (laboratory equipment and scientific

tools), symbols of knowledge (e.g., books, filing cabinets), technological products (e.g., computers), inscriptions such as "eureka!", mathematical or chemical formulas, taxonomic classifications, and natural objects (animals, plants, or astronomical objects).

Although the original name of the study is "Draw a Scientist!", Christidou, Hatzinikita, and Samaras specifically tasked 12-18 year olds with "Draw a Researcher!" (Christidou et al, 2010). It is worth noting here that while the definitions of a scientist and a researcher can differ significantly, in the literature specifically dealing with related stereotypes, this difference is not really found; the two terms are almost synonymous.

In our primary research in Hungary, we also used the concept of "researcher." During the focus groups conducted among university students, although we did not ask the participants to draw, we did ask them the following:

"Imagine that we are expecting a typical researcher to join us. Suddenly, there is a knock at the door, and they are standing here before us. Describe them! (Appearance, inner qualities, family status, financial situation, health condition, gender, age, grooming, character, clothing, behavior style, etc.)

- What kind of life do they live?
- What is most important to them?
- Do they have goals or plans? What are these?
- How successful and satisfied are they with their life? Are they happy?
- How do they spend their free time? Do they like to have fun? How? What do they spend their money on?
- How do they behave in a social setting: with friends, strangers, men, and women?
- How sympathetic is this lifestyle to you? In what ways would you like to be similar to them, and in what ways not? Why?"

In addition, as an introduction and conclusion, we also asked the university students the following questions:

- "What do you think about a research career? What comes to mind when you hear the words research and researcher?"
- "In your opinion, how does research and its results affect your immediate environment and your own life?"
- "How can scientific research be made interesting as a career for the 18-24 year old Generation Z, in your opinion?"

As can be seen from the many open-ended questions, the survey was qualitative, specifically focus group-based. We organized a total of 4 such groups, involving students from 4 higher education institutions: two in Budapest, at the Budapest University of Technology and Economics and the Budapest Metropolitan University, and two in the countryside, at the University of Sopron and the John von Neumann University in Kecskemét. The participants in the groups were 18-24 years old, with an even age distribution, and included both men and women from economic, technical, and social science disciplines. Additionally, we ensured that each group included at least 2 people who had participated in the Scientific Students' Associations (TDK), at least 2 people who worked alongside their studies, and at least 2 people who had their own business or were involved in a family business.

The advantage of the focus group method over individual interviews lies in the interaction between participants, allowing us to gain a better understanding of how the respondents relate to, think about, and feel regarding scientific research and researchers (Vicsek, 2006; Mitev et al, 2015; Cyr, 2019; Straus, 2019; Krueger & Casey, 2014; Morgan, 2018; Stewart & Shamdasani, 2014). In addition to the specific answers given by the

respondents, the comments, gestures, and group dynamics provided valuable information. Due to the nature of the topic and its relevance, we deliberately chose a moderator for the focus groups who was not an academic or university lecturer, but rather a researcher working on market assignments.

One of the main strengths of the focus group method is that it is more suitable than other methods for modeling opinion formation and debates, making it particularly useful for assessing stereotypes related to a group, as our experiences have confirmed. While the primary purpose of focus group research, as implied by its name, is to focus later, primarily quantitative research, the methodology itself can provide concrete results for exploring opinions and attitudes (Schleicher, 2007; Babbie, 2020). These results are presented in the following sections.

RESULTS OF THE PRIMARY RESEARCH

As previously mentioned, we asked the focus group participants to imagine the typical "specimen" of a researcher, embodying all the characteristics that make researchers unique. While the answers were varied and reflected different opinions, several common characteristics emerged. It also became evident that personal experiences played a role in forming the image – since the respondents were university students, they might have met researchers, and in many cases, their university lecturers were also researchers, or at least the students thought of them that way. However, in this group, the influence of film experiences such as Indiana Jones or The Big Bang Theory was also significant. Based on the results, the following conclusions can be drawn - with some comments from the participants in parentheses:

The Gender of the "Typical Researcher":
- More likely male ("Male. Male. The average is male."; "Male."; "I would like to think it could be a woman too, but because of the stereotype, a man comes to mind.")
- Could be female ("Around 40-50 years old, more likely female. She doesn't care much about appearance or outward appearances, focusing on being clean and orderly, but not making fashion a priority.")
- Gender is not clearly defined ("It doesn't matter if they are male or female, as long as they are dedicated and persistent."; "I wouldn't define it clearly."; "When I hear 'researcher,' a picture comes to mind, and I can't imagine it being only a man, rather both a man and a woman.")

The Age of the "Typical Researcher":
- Old ("Wears glasses. Old.")
- Could be young – This shows the influence of The Big Bang Theory ("Completely random, in The Big Bang Theory, for example, Sheldon Cooper is a very young person, a twenty-something who won the Nobel Prize, that's what the series is about.")
- Middle-aged ("I think around 40."; "I would say 40-50... That's when a career typically peaks."; "I would say 30, under 30 is very rare, over 40 yes, more likely from 30 onwards."; "I imagine them middle-aged, over 45, when they can fully flourish in their career, not just as an assistant or intern, but possibly as a leader of something.")

The "Typical Researcher's" Characteristics:
- Organized ("Very organized.")
- Curious and passionate ("Curious. Can be passionate about a particular topic.")

- Team player ("A team player, they usually don't research alone, there is always a process in research that involves more people.")
- Dedicated ("Because they are dedicated.")

The "Typical Researcher's" Financial Situation:
- Dependent on the research topic. Generally characterized by moderate financial well-being. ("Poor."; "It depends."; "I know a historian who made it in life, you could say that."; "It also depends on the research topic. Someone may not achieve anything with their research, but someone else, like this archaeologist, might, and be recognized in the end.")

The "Typical Researcher's" Appearance:
- This topic sparked intense debate. Opinions ranged from shabby to very elegant. ("Elegant."; "Shabby."; "There are those who are very elegant, and those who wear simple everyday clothes."; "I think of them as more elegant."; "It also depends on how they dress and what field they research."; "The archaeologist, historian I know is quite elegant."; "Male, modest."; "Groomed. Yes, groomed.")

What is Most Important to the "Typical Researcher":
- Research is a life goal, not just a job. ("Research itself. That's the goal. They dedicated their life to it."; "The beginning and the goal of research, they dedicated their life to it."; "To achieve something."; "To achieve results with their research."; "They have no other goal, whatever they set out to achieve, they fulfill it, in any field."; "They crave a bit of recognition."; "Nobel Prize."; "A warm handshake, a hug, or a pat on the back.")

The "Typical Researcher's" Behavior:
- An average character in behavior. Not the center or leader of the group, but not on the periphery either. ("Not necessarily standing out, but not withdrawn either. Not the center of attention, but not the most withdrawn personality. I would say more average.")
- Talks a lot in social settings, but mostly about their research topic. ("In a group, they are happy to talk to anyone."; "And they talk a lot."; "About their own topic."; "Open to new topics, hoping they relate to their research."; "But can steer the conversation to their own topic.")
- A specialist, focused only on their work. ("A researcher is always researching, always seeking opinions on how others see the world, always asking how others see the topic they care about."; "Constantly working, doing things, and eventually collapses from exhaustion."; "Like Indiana Jones types, one moment they're on the podium, the next they're out in the field, that's how I imagine male researchers, and similarly female ones too.")
- The satisfaction and happiness of the "typical researcher" depend largely on the amount of recognition they receive. ("Happy, yes, because they are dedicated, they think they can achieve a very good goal if they can discover something."; "Yes, they think of their work as their hobby, doing it with heart and soul."; "I think they are not happy at all."; "Neither do I."; "Because they look for what is wrong, not what is good, and for that, you need a highly developed social awareness to see the beauty in life, which scientists are not known for; they excel professionally, but not in social skills, so they see more negativity, especially socially, because they are not the center of the social circle."; "I would say they don't get enough recognition for their work. There are very few researchers today, many constantly come up with

new things, but very few remain at the level of being awarded honors, even though they constantly develop things, but many do not receive such recognition. Even intellectual recognition, just the title of being considered a real researcher, and as we mentioned, the pay is not adequate.")

DISCUSSION: COMPARISON OF INTERNATIONAL AND DOMESTIC RESULTS

Based on the focus group studies conducted among Hungarian university students, it can be stated that the image of researchers and the stereotypes associated with them are very similar to those found in international research.

The only significant difference is perhaps the stronger presence of the opinion that researchers are characterized by modest financial circumstances. This may be related to the perception that researchers are "smart fools" who serve humanity but are not adequately rewarded or recognized for it.

Based on the four focus groups conducted among university students, the results can be summarized as follows, depicting how young people view researchers:

- The typical researcher is a middle-aged, 40+ man.
- They are characterized by dedication to their work.
- They are organized, curious, and passionate, especially about their work.
- Financially, they are generally seen as having modest means, although this also depends on how current their research topic is.
- Their appearance is not strictly defined; they can be shabby, casual, or even very elegant.
- For the typical researcher, the most important thing is the success of their research and gaining recognition for it, whether professional, moral, or financial.
- They are an average character who fits into social life but is not its center.
- They talk a lot about their work and are not much interested in other things, a specialist.
- Their satisfaction and happiness largely depend on how much recognition they receive.
- Overall, they are seen as a kind of "smart fool."

POSSIBLE SOLUTIONS FOR REDUCING NEGATIVE STEREOTYPES AT THE INDIVIDUAL RESEARCHER LEVEL

The stereotypes formed over time about various social groups are difficult to change. In fact, they are often so strong that when we encounter an individual from that group who does not fit the stereotype, we tend to view them as an exception that reinforces the rule, rather than questioning the stereotype itself (Tintori & Palomba, 2017; Lippmann, 1991).

Therefore, it is important to emphasize that many cumulative experiences can change stereotypes – whether they are direct or indirect experiences. There are undoubtedly ways to bring about this change, which include both individual and group tools. In the following, we will present some of these tools – without giving a complete picture, as there are many other possible solutions for shaping the stereotypes associated with researchers. The good news is that there have never been so many opportunities and communication platforms to convey a positive image of research and researchers.

A well-known phrase in the world of scientific research is "publish or perish". While this used to mean appearing in scientific journals, today it also involves reporting on these publications and summarizing the results as comprehensibly as possible. This has been termed

"science communication", which means communicating research results to funders, users of the research, and last but not least, the general public (Mazzitelli, 2019).

In addition, it has become increasingly important to showcase the researcher or researchers behind the research. Social media has been particularly helpful in this regard. Based on the recommendations by Minucci & Severo (2014), and significantly expanded their original list, tools for this can include:

- Introducing the researcher on the website of the institution (research center, higher education institution, or similar) where they work – and what information is displayed about them there and how
- A short introduction at the end of the researcher's email signature, or even a brief list of recent publications
- The researcher's own website, where they can compile their publications, present their interests, research topics, and show that "they are human too"
- The researcher's blog, where they regularly publish interesting professional, yet easily understandable content about their research
- A Wikipedia entry about the researcher, highlighting the significance of their work and persona
- Academia.edu and Researchgate.net platforms, which are primarily good for increasing the visibility of their scientific research, the number of citations, and connecting with other researchers with similar interests
- LinkedIn, where relevant professional content can be published, and personal branding can be built
- Facebook, where researchers typically present both professional and personal content
- Instagram, where pictures can be used to communicate effectively and highlight exciting results
- TikTok, where short, interesting, useful, even entertaining videos can summarize a piece of research
- YouTube, which accommodates longer videos
- Twitter, or its new name X, which allows for very short text posts and redirecting links (though Twitter is negligible in Hungary, it can be important for international visibility)
- Presentations not only at scientific conferences but also at professional events where industry practitioners are present
- TED or TEDx (Technology, Entertainment, Design) events, presenting the most inspiring thoughts of the research and showing the researcher's personality—in a maximum of 18-minute talks
- Even shorter presentations, such as "my research in 3 minutes" type events
- Media appearances and press releases on specific topics

With these tools, both the professional and personal image can be significantly improved, and the reach to the broader public can be much higher.

Moreover, this has become an expectation today. As the European University Association's material for doctoral students states (2022): To maintain social relevance, doctoral candidates must maintain open and regular contact with society through various activities that express the modern self-image of researchers. The 2010 Eurobarometer survey also shows that researchers need to consider two important aspects in their communication: reliability, which depends on scientifically proven results, and the presentation of knowledge in a form that is easily

understandable to the general public. Essentially, Roland's writing (2009) also pointed this out, emphasizing that while doing so, the quality of research and the integrity of researchers must be maintained.

It is important to note that regular communication does not necessarily mean that the individual is a better researcher or that their research is more useful. Samoilenko & Yasseri (2013) conducted an interesting study on this topic, finding no statistically significant correlation between the metrics of Wikipedia profiles about individual researchers (length, number of edits, number of incoming links from other pages, etc.) and the academic significance of the mentioned researchers, measured by citations to their works. In other words, having a better Wikipedia page does not make someone a more outstanding scientist.

This often raises the criticism that communication can divert attention from research work and goals, creating a situation where appearance becomes more important than content (Mazzitelli, 2019).

Perhaps this is why many researchers do not invest time and energy in communicating their scientific results beyond narrow professional platforms. However, surveys show that even these less communicative researchers occasionally search for their own names on Google to see how visible they and their work are. In this sense, they are also aware of the importance of their digital "footprint" (Minucci & Severo, 2014).

SHAPING STEREOTYPES ABOUT RESEARCHERS AS A GROUP WITH THE HELP OF RESEARCHERS' NIGHT

Alongside individual communication by researchers, equally or perhaps even more significant is the type of communication that generally raises awareness of scientific research and the importance of the researchers behind it. In this article, we highlight one such event, Researchers' Night, and due to the constraints of this article, we will do so briefly.

Researchers' Night is an initiative launched by the European Commission with the following objectives: a) to improve the image of researchers within society; b) to draw public attention to research, innovation, and new technologies; c) to bridge the gap between researchers and citizens by showcasing the societal benefits of research and technological foundations; d) to introduce young people to technology and scientific issues; e) to encourage teachers and governments to support young people in choosing a research career (Christidou, et al, 2010)

The first public Researchers' Night event was organized in Brussels in 2006, and today, all major higher education and research institutions hold such events across Europe (Mazzitelli, 2019).

However, these events are often criticized for actually reinforcing stereotypes about researchers. In many cases, the researchers simply talk about their topic in an unengaging way or demonstrate one or two laboratory experiments, which the audience views as outsiders, thereby reinforcing the perception that researchers are somewhat eccentric.

Tintori & Palomba (2017) dedicated a book titled "The Light: Turn on the Light on Science - A Research-Based Guide to Break Down Popular Stereotypes About Science and Scientists" to address how "Researchers' Night" can genuinely reshape stereotypes about researchers. They based their recommendations on the events they organized in Italy. According to their suggestions:

To make an impact, the event must simultaneously meet the following three criteria: 1) the interactive experiences should be social in nature; 2) they should affect not only the minds

but also the hearts of people; 3) they should offer something unique that cannot be found elsewhere. Additionally, they highlighted the following points (Tintori & Palomba, 2017):

Visitors should spend an average of one and a half to two hours at such events for the activities to have a real impact on breaking down stereotypes about researchers.

Besides the content of the event, the venue also plays a crucial role. Interestingly, they concluded that the event should not be held in a traditional university lecture hall or a lab, as this would only reinforce stereotypes. Instead, the event should be held in a unique location, such as a theater.

It is not necessarily sufficient for researchers to talk or conduct experiments, even if they involve the audience and the topic is inherently interesting. This alone will only reinforce the notion that they are deeply immersed in an exciting subject or that they are "nerds" or "geeks," but it does not show that they fit well into society, are friendly, or even "cool." This can be achieved through supplementary events where researchers showcase their hobbies and what they do in their free time. This can help dispel the stereotype that they are only focused on their work.

For this reason, Tintori and Palomba, in addition to classic scientific outreach events at Researchers' Night, created a special entertainment venue called the Globe Science Theatre. Here, scientists entertained the audience with artistic performances or sports demonstrations: there were tango dances and judo exercises, performed in groups rather than solo acts, demonstrating that researchers are not lone wolves but social beings (Tintori & Palomba, 2017).

SUMMARY

Stereotypes about researchers have developed over decades, even centuries. The established image is influenced by classic and social media, education, the opinions of acquaintances, and to a minimal extent, personal experiences, as the average person rarely encounters researchers.

Both international secondary and domestic primary research results have confirmed that the public, including young people, hold quite outdated views about what a typical researcher is like. This simplified and often negative image can be harmful in several ways, including when it comes to funding research or encouraging young people, especially girls, to pursue a career in research. It also affects how the general public perceives researchers and the value of their work.

Of course, there are positive stereotypes about researchers as well: they are seen as intelligent, smart, dedicated, even geniuses, and sometimes famous or even cool. However, a positive stereotype is still a stereotype. Surprisingly, the belief that scientists are inherently exceptional can be just as harmful as a negative stereotype. This can set unrealistically high standards and hinder young people's ambitions to become part of this group. "I'm not a genius, so I can't be a researcher," "I'm not smart enough to excel in science," or "Science is too difficult for a girl like me" can be common excuses.

To break down these stereotypes, one-sided communication is not enough; a dialogue between scientists and the non-scientific public is necessary. With the tools listed in this article, it is possible, albeit slowly, to shape the narrative about researchers and science so that people understand who researchers really are and what they do. As one of the slogans of the "Researchers' Night" series of events states: "Researchers are human too."

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