

Reaching Out to a Lot of People

SCIENCE ONLINE

Reliability, honesty, as well as empathy, a sense of humor, and avoiding patronizing your audience. *Academia* asked popularizing scientists about the key to success.

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ACTIVE ON: Instagram, TikTok

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Both scientists focus on the production and use of nanomaterials in energy conversion and storage devices, as well as electrochemical sensors. In addition to scientific work, they have been popularizing online learning since 2021. In 2023, they were recognized in the Popularizer of Science competition and received the Pop Science award of the Silesian Science Festival.

More: <https://science-mission.pl/>

When we started our activity, we decided to show that science does not have to be difficult, boring, or detached from everyday life. However, we do not hide that we had to find the right balance between accessibility and scientific precision. This was by no means easy and – as is usually the case – with time and numerous attempts, we got the knack for doing it right. On the one hand, we want this content to be light, engaging, and understandable to people who have no contact with science. We also know very well that the materials cannot be too long

or too serious, as that might effectively put someone off. And if we want the material to be shared further and reach more people, it must evoke emotions. On the other hand, we want to ensure that we do not lose our reliability and, above all, that we do not mislead anyone.

It is very often the case that additional explanations and literature sources are added in the description of a reel. Recipients also ask us for details in the comments. Then, depending on who asks the question – we are already beginning to recognize our audience,

or we check whether the person has a scientific background – we adjust the level of detail accordingly. We also emphasize that these are not lectures on physics, chemistry, or biology, but material which is intended to grab someone’s attention. We also hope to show that this knowledge is genuinely useful in everyday life.

For us, every post or reel is a kind of experiment, showing whether we’ve managed to find the right balance and whether we’ve succeeded in presenting complex processes in an engaging way. Very often, we reach for analogies from daily life. After all, we don’t have to show complicated equations right away to explain what the Higgs boson or the Leidenfrost effect is (the latter being manifested, for example, by a water droplet retaining its shape on a hot frying pan before evaporating). Instead, it is enough to explain how it works and how you can use it when preparing a pan for frying. Such an approach makes science more accessible and easier to understand. We proceed similarly when we want to show more complex experiments. Instead of showing difficult and often tedious laboratory procedures, we propose experi-

ments that can be recreated at home, either individually or together with children. Anyone can extract DNA from a strawberry, make figurines from milk, build a simple motor using a battery, or make cubes of frozen tonic that glow under UV light.

Sometimes, to attract attention and add a humorous element, a cat appears in our materials, and a kitchen apron becomes an extra item of clothing when we explain the phenomena behind everyday cooking. This is also our way of showing that neither science nor we need to be treated with stiff formality. Of course, we don’t hide behind our titles or academic degrees either. We much prefer to be called Kasia (or Katie), which definitely makes communication with our followers easier.

Both of us also feel more comfortable in different areas of our work: one prefers writing scripts and verifying information, while the other has no problem appearing in front of the camera to “sell” the content. We both believe that popularizing science should not be about oversimplification but finding the right tools that enable people to understand it. ■



Konrad Skotnicki, PhD, Eng.

Science popularizer covering topics related to the natural sciences, space, climate education, and ecology. His online work regularly reaches several million people a month. He holds a doctoral degree in chemistry and, for many years, he worked at the Institute of Nuclear Chemistry and Technology, researching potential anticancer drugs. Author of the book *111 faktów, które zniszczą twoje wyobrażenie o świecie* [111 Facts That Will Destroy Your Perception of the World].

ACTIVE ON:

Instagram, TikTok, YouTube

 @doktor_z_tiktoka

 @doktor_z_tiktoka

 @doktorztiktoka

All my life I was afraid I was sick, My mom told me there was something wrong with me – these are just a few examples from thousands of comments under one of my TikTok posts explaining why vaginal discharge may discolor underwear. I tried to squeeze it out, I was afraid it was cancer – these were comments under a video showing that anyone can see the opening of their tear duct. In these and thousands of other situations,

the Polish education system has failed, leaving young people with fundamental gaps in knowledge about their own bodies. They are increasingly searching for answers to these basic, often embarrassing questions on social media – the same media where, for every reliable creator, there are at least a few people trying to sell left-handed vitamin C for cancer, DMSO to enhance reasoning, and alkaline water to improve mood.

Effective systemic solutions to fight misinformation and quackery are nowhere to be seen yet, which is why I believe that now more than ever the presence of people who work in science on the internet is crucial. This is no longer a matter of hobby but a matter of social responsibility for science. My idea for popularization is to address real human needs and fears. Instead of starting with complicated mechanisms, I start with a question someone is afraid to ask a doctor or one which is typed into a search engine at night. What works is empathy and a non-judgmental tone. People don't want to listen to someone who makes them feel less intelligent or patronized.

The biggest difficulty is to find a language that is simple but not overly crude or oafish. As someone who has worked for many years in scientific positions, I also feel the temptation to share every nuance. However, the key is, on the one hand, simplification, and on the other, distillation – separating the essential information from the scientific jargon and details

that are just noise to a layperson's ears. This is not about imposing your message on people but about translating from scientific language into more casual language and showing respect for both. You have to watch out for the trap of your own knowledge and remember that concepts obvious to us can be entirely new to others.

What else is difficult? Time. Science popularization is yet another full-time job, often invisible and underappreciated in grant and promotion systems. It is also, for many people, an enormous emotional burden – dealing with hate, conspiracy theories, and a sense of Sisyphean labor.

Still, the satisfaction is enormous. A comment like *Thank you, you've reassured me* is emotionally worth more than publication points. The presence of scientists on the internet is real action. We fill the gap left by education, build a shield against misinformation, and restore trust in science. Precisely today, amid a deluge of fake news, that is our most important mission. ■



David Myśliwiec, PhD

Chemist who has spent 11 years popularizing knowledge and fighting scientific fake news. On the YouTube channel "Uwaga! Naukowy Belkot" [*Careful! Scientific Gibberish*], he has published over 400 videos, which have been watched a total of 120 million times. The channel features in-depth materials explaining topics from the broadly understood natural sciences, shorter videos with scientific trivia, and the podcast *Przegadana godzina* [*An Hour Full of Talk*]. Author of the bestsellers *Przepis na człowieka* [*The Recipe for a Human*] and *7 cząsteczek* [*7 Molecules*].

Monika Chylińska, PhD

Chemist and holder of a doctoral degree in agricultural sciences, professionally affiliated for many years with the Institute of Agrophysics of the Polish Academy of Sciences. At *Naukowy Belkot* [*Scientific Gibberish*], she is responsible for operational activities. Author of the popular-science children's book *Lelony odkrywają. Dlaczego niebo jest niebieskie*. [*Lelons Discover: Why the Sky Is Blue*]. Scientist and science popularizer.

ACTIVE ON: YouTube, Instagram, Popular-science books

📷 @naukowybelkot 📺 @naukowybelkot

Treating the audience seriously – that's the most important rule we've learned over more than 10 years of our popularization work. The truth is that people are interested in science and often fascinated by it. They want to better understand the world, and science makes that understanding possible. Fortunately, at *Naukowy Belkot* we want to talk about it – and we enjoy doing it.

As we write this, we are fully aware of the many difficulties faced by science and by those who try to bring it closer to non-scientists today. We live in times when conspiracy theories and pseudoscience are gaining popularity, and as a result, public trust in researchers from various fields is declining. This phenomenon no longer seems marginal. The responsibility of science people – which we believe includes popularizers and

educators – is growing day by day. It now involves not only presenting the complexity of specific issues in an understandable way, but also explaining what science actually is, what mechanisms govern it, and what its limitations are. Although science is the best tool for describing the world, it is not perfect, and in many areas the scientific system does not keep pace with changes taking place globally. We must emphasize that science is a living organism – that it changes – and that these changes (stemming, in fact, from a fundamental feature of science: continuous self-correction) are not a weakness but its greatest strength. There are more shades of gray in science than it might seem, and the more people become aware of this, the greater the benefits for society.

When we create content for our audience, we try to keep that in mind and to meet their expectations. We draw topics from everyday life: from books, media reports, comments from our viewers, and, recently from questions asked by our preschool-aged children. Many of these questions seem trivial at first glance, but upon closer examination, they touch on fundamental issues or allow us to tell a surprisingly engaging story. However, we always choose topics that personally pique our interest. That is important, because it is difficult to speak passionately about something that does not spark genuine enthusiasm or curiosity in the speaker.

We would be lying if we said that we do not feel the burden of responsibility on our shoulders. We are aware that our videos matter greatly to many people and that some viewers may make important deci-

sions based on them. After all, the audience for each video on the *Uwaga! Naukowy Belkot* channel can be counted in the hundreds of thousands – and that carries an obligation.

For years, we have cooperated with Dr. Patrycja Jakubek-Olszewska and Dr. Anna Mleczko – regular weekly online meetings help us gather and verify data. At this stage, the work is similar to the literature review conducted before writing a scientific paper. We create extensive notes that form the basis of an episode's script. The script is always written by Dawid in order to preserve our proprietary tone and storytelling style. The next stage is team review: the text goes back to Patrycja, Anna, and Monika, who check it again in terms of both the content and narrative. We make corrections, ask questions about sections requiring clarification, identify inaccuracies or excessive simplifications, and consult scientific sources once again. After the material is recorded, it is reviewed again by the team. We also pay close attention to the visual form of our productions. This part is handled primarily by Adam Myśliwiec, editor, and Monika Waryszak, graphic designer.

Despite several stages of verification, it is not always possible to avoid errors, although we do our utmost to eliminate them – no one is infallible. If an error does occur, we try to respond appropriately and add corrections. This is, too, part of our responsibility. And while our work may seem trivial when described so simply, the truth is that for virtually every project we have completed over the past few years, there was a moment when we could have said, "It's complicated..." ■

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**Adam Mirek, PhD, Eng.**

Doctor of biomedical engineering, science popularizer, author of the books *Bebechy* [Guts] and *Glutologia* [Snot Science]. Winner of the Empik Bestsellers Award. He was the first Pole to appear TikTok's prestigious *The Discover List*. He combines scientific knowledge with modern forms of communication and education. Founder of Fundacja Poznawcza [Cognitive Foundation]. Young audiences appreciate his energy and humor, while older audiences value his education in Poland and France.

ACTIVE ON:

Instagram, TikTok,
Popular science books

 @adamxm  @adam_mirek

When I think about popularizing science, I picture not only a lecture hall full of more or less interested students, but also a phone screen. It is here – in short videos and posts – that science today meets people outside academia. My approach to science popularization is simple: a short video as an invitation to the world of science, not an in-depth analysis. I keep reminding myself that the Internet is not a university, so I do not have to adopt an academic narrative. I want my content to reach everyone – even someone who has bad memories of science because something was once explained incorrectly at school and that misunderstanding stuck. If, thanks to me, such a person realizes that science is not so scary and can even be interesting, I consider that a success. And if they additionally notice that science is truly present in everyday life and can be useful, then step by step we are building the social responsibility of science from the ground up.

Of course, it is not easy. At first, the biggest challenge for me was the short format. Internet videos have their own rules – the viewer's attention lasts only a moment, so every frame matters. Consistency is also a challenge and is the foundation of growing social media channels. A lack of topics is not a problem at all – quite the opposite. Questions from viewers appear in such numbers that it is impossible to keep up with responding to them. Today, my biggest challenge turns out to be digital hygiene, as I am almost constantly online, and disconnecting from my phone can be harder than it is for someone who can afford a week offline without consequences.

What else do I pay particular attention to? Emotions. The Internet thrives on controversy, but I try to

avoid topics that easily provoke polarization. Before I publish anything, I always consult reliable sources and conduct thorough research. I am aware that with such a large audience and the trust placed in me, every word I say carries weight. That is both my superpower and my curse – it gives me influence, but it imposes great responsibility.

Over years of activity online, I have developed several methods that work particularly well in science popularization. Above all, I take a lighthearted and relaxed approach, even to difficult topics, because science presented with some distance and a smile reaches much further. Debunking myths – especially those carried over from school – is also effective. It gives people the joy of discovery and a sense of small rebellion against the system. Authenticity is extremely important as well, because audience can sense whether they are being spoken to from a lecturer or addressed by a classmate sitting next to them. The latter works better. Finally, answering viewers' questions – which they do not always know how to articulate clearly – is extremely valuable. These questions arise from everyday experiences, doubts, and the childlike curiosity that adulthood so often silences. I'm happiest when I manage to answer them in a way that makes a viewer's eyes light up and prompts a comment like, "Oh, so that's what it means!"

When I see an avalanche of such comments under my videos, I feel that science popularization truly makes sense. And not everyone has to become a scientist right away. What matters is that science is present in public awareness as something accessible, useful, and interesting. ■