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At the heart of scientific breakthroughs lies the ability to think outside the box, challenge conventional wisdom and visualize complex concepts in unexpected ways. Creativity fuels these processes as it drives scientists to ask bold questions, formulate hypotheses and pursue unconventional lines of inquiry. The harmonious interplay between science and creativity is essential for driving innovation, solving global challenges and expanding the frontiers of human knowledge and expression.

Today in research and beyond, we have with us Dr. Jayshree ma, a corporate scientist and the first ever chief science advocate at 3M, a multinational conglomerate operating in the fields of healthcare, protective equipment and consumer goods, holding 75 plus patents. Dr. Jayshree is a highly sought after speaker and an author featured in both local, national and international media. She was awarded the highest achievement award by the Society of Women engineers in 2020 and was the first ever winner of the Gold Stevie Award in the New Female Thought Leaders of the year category in 2021. Join us in this conversation to understand the role of creativity in science and misconceptions surrounding it with not so science type.

Dr. Jayshree Seth, thank you so much for agreeing to this interview. As empowering as it sounds, what does it mean to be the chief of science advocate at 3M? Well, thank you for having me here.

Okay, so let's start with my, my role first. So science is our most distinguishing characteristic at 3m. It's what ties our businesses together.

It's the foundational strength behind our brand, science applied to life. So we wanted to understand the public perception of science. And unbeknownst to me, a global survey was dacone.

Fourteen countries, India included, thousand respondents per country. And when the results came back, they were very interesting. Four out of ten people said if science didn't exist, their lives would be no different.

And 32% of the people called themselves science skeptics. And in this population, 6 out of 10 said if science didn't exist, their lives would be no different. So it was quite shocking.

And they were taking the survey on their laptops and mobile phones. So we know what the issue is. Science is like invisible, underappreciated, taken for granted.

And people don't realize that, you know, the gadgets and the devices that they can't live without, these are applications of science. You know, it's decades of scientific research. So we decided it was important to advocate for science.

And I was asked to be the chief science advocate. And I think I'm the only one with this title in the world, but we thought it was important. So that's how my, my role came about.

So how Is donning this role, in addition to your position as a corporate scientist at 3M, influenced your science advocacy efforts? Yeah. So that's a good question. When they first approached me, I was skeptical because, you know, now I'll have to give up some other time in the lab and be doing this, and what is this? And why don't people care about science? Blah, blah, blah.

But then I realized, you know, people are just responding based on the perception they have, and their perception is their reality. And this is kind of an issue that people don't care as much as about science as they should. And then I started thinking about my own story.

You know, I grew up in India on the campus of an engineering institution, and I was not interested in pursuing STEM because I didn't think it related to my strengths or my goals because science was always talked about in such dry terms. And, you know, my dad was a professor at Roorkee, and it used to be University of Roorkee, now it's IIT Roorkee. And I never saw a woman engineer while I was growing up.

And I don't know, maybe that played a part as well. So all these things in my own background, I think, impacted my advocacy because the data also suggests that there are challenges for women in STEM and that women trail in the positive sentiment for science. And so the issues of underrepresentation and bias and stereotypes, I think these are real issues because we need diversity in STEM fields.

So I started to try and understand why is it that me and other people like me did not want to go into STEM careers and understand this goal incongruity that we felt because of how we teach, train, typify, track, and even talk about stem. So that's what I started to do, is to bring my story through to life through my role as an advocate and advocating for science and for careers in stem. So right now, as you mentioned, that through your role as an advocate, you have been an active.

You have been actively propagating representation values and have been trying to aim different perceptions in science. So extending these lines to the State of Science Index, that is sosi, which aims to assess the global attitude toward research and gauge the public perception about its impact on the society. How successful do you think has SOSI been to evolve the global perception of science since its adoption, particularly in the light of pandemic.

And what do you think contributed to this shift? Yeah, so what you're mentioning is our survey, State of Science Index, and we did it in 2018, and, you know, four out of 10 said if science didn't exist, their life wouldn't be any different. But during the pandemic, we did a pandemic pulse, and it was an important moment in time to do this research. And we were able to manage 10 countries.

And the data showed that science was really having its moment. Skepticism went down for the first time since we started tracking. And during the pandemic, it was the lowest we have seen and trust was high.

And why is that? It's because scientists were center stage and science was in the public discourse. I mean, virtually all of humanity, we faced the same existential crisis, we confronted the same fears, and we all awaited for the gift of science in the vaccine. So the public connected science to the ability to solve problems.

So that is why we believe that the perception of science became extremely positive, because science was then connected to hope. Science was connected to the possibility of solving problems, not just because of our health, but also problems that we face from a sustainability standpoint. So that's why I think the public perception changed and it had become a lot more positive during the pandemic.

And I think the public perception towards science, the gap between scientific research and public understanding has played a pivotal role in that. So this gap, also known as the research practice gap, has led to miscommunication and divided opinions on several concepts, especially the ones related to health care and especially during the pandemic. So there were several concepts.

There were several concepts associated with the vaccine development which kind of led to a negative outcome among the masses. So science advocates like you have always been striving to decrease such gaps. So what challenges do you anticipate in bridging this gap, and how do you believe that these challenges can be addressed? Yeah, that's a very good point.

I think it has been something that was really put in the spotlight during the pandemic, as you said, from an advocacy perspective, I like to think of it very simply as A, B and C. So A is for raising the awareness, the appreciation and the acknowledgement for science and the role it plays in our everyday lives and moving people from the apathy that they feel, if science didn't exist, my life would be no different. B, to me, is for breaking down biases and barriers and boundaries and beliefs.

You know, that, oh, I can't do science or genius, etc. Because all of these then get in the way of people understanding science. And the most important is C, which is communication.

Communication, communication, communication with a context that people can see and relate to. And that is so critical. So scientists struggle to communicate their Research in simple relatable terms that a layperson can understand, then if scientists are giving mandates or providing recommendations, people are not going to be able to understand.

So it is important to contextualize it, contextualize all the data and tell stories based on this data, and use very clear analogies to make your research and your results more interesting, more applicable. You know, you're not talking to a community of peers when you are talking to a layperson. So it's very different what you would discuss in a community of researchers versus what you would discuss to the public.

A lot of social science also has a strong role to play the human context. So, and as you mentioned, there is also this general lack of trust that is increasing these days with institutions. Scientists do still enjoy among the highest level of trust, but there is this perceived lack of relatability towards scientists in some circles.

So I think it is very important for scientists to also come across as accessible and relatable and as regular people. And so you need to share your own personal story a little bit as well, and the background to what led to this work and how is it relevant and who it involved, especially if there is community involvement. And so if you address these challenges, you know, improving communication, fostering a level of trust, emphasizing the relevance, increasing accessibility, then I think the gap that you talked about between scientific research and public understanding can be bridged more effectively.

And I think it's important because there is this paradox of trust situation. You can't trust something unless you understand it, but you can't understand something without trusting it first. And human trust is a very fluid concept.

It's very personal. You can't really put a finger on it. So we do need a better understanding of what influences the public's willingness to engage with something and trust it.

And this place is a lot of emphasis on effective communication and humanizing of science. And so I often write in my books, the real shtick is stem. It is the interaction of humanities with stem, so humanities with science, technology, engineering and math.

And if you keep this chasm between STEM and humanities and it widens, then both of the disciplines have a lot to lose. So just because you spoke about humanities and science just now, I'll shift the gears a bit. What role does creativity play in the scientific process? Also, how do you compare and contrast the role of curiosity and creativity for a successful scientific endeavor? Oh, don't even get me started.

Creativity plays a very big role. I would say it is literally the driving force behind, you know, all scientific discoveries, asking new questions, devising New methods, interpreting your findings in novel ways, pushing the boundaries of human knowledge with a lot of resilience, you know, to go at it in different ways. That is fundamentally creativity.

So we, we really need to dispel this misconception that science is, you know, a purely analytical endeavor and not just scientific research. Creativity is key for the application of that research and turning it into innovation. And that's what the work my peers and I, we do at 3m.

And you know, people don't understand sometimes that these are skills that can be developed. And so that's another very important piece that people, you know, think about. But both are important.

Curiosity is about the what and the why, and it drives the initial exploration and the questioning. And creativity is about the how, how you generate these novel ideas or interpretations or inferences necessary to advance that scientific understanding. So the two, in my mind, curiosity and creativity work in unizing with curiosity, you know, sparking that scientific endeavor and creativity, providing that, that innovative thinking along the journey.

So there's ample research to show they're both learnable and both trainable skills. They can be nurtured through practice and through diverse experiences, through a supportive environment. So it's important to foster that culture of open inquiry and receptivity to really cultivating that.

And, and together they just form this, this synergy that can push scientific progress and really expand the boundaries of human knowledge. So speaking about misconceptions, about the intersection of science and creativity, so there are several, like you had listed, few just now to add on to those misconceptions. People often say that science and creative, creative domains are poles apart, or creativity is just about artistic expression, like you write a book or paint a, paint a picture or something like that.

Unlike science, which requires empirical evidence. So how can these misconceptions be addressed? And how do you think, can people boost their creative skills? Yeah, science and creativity are not separate domains. That is just not true.

They're deeply, deeply intertwined. I would even go so much as to say that my entire career has been about bringing the two together. And my success has basically come from that is the use of creativity in the application of science.

And it's because scientific discoveries and innovations, they require creative thinking to identify these different questions and develop methodologies. And it's just an essential part. Creativity is for progress and innovation.

And I think the pervasive myth is of this left brain, right brain, and it has been, oh my God, dispelled so many times that it's a myth, but it's one of those sticky myths. That people still talk about, and it's not true. We can all use both sides of our brain and balance logic with creativity.

And society needs creative scientists for continued innovation. And artists and creatives can benefit from knowing more about science and technology. So the problem is the stereotypes feeds into this.

Scientists usually don't have the reputation for being very creative. And the notion that, oh my God, you have to adhere to a method and generate copious amounts of data and conduct tedious analyses, you know, it suggests lack of creativity. But I think very few would dispute that great scientific and technological innovators were all creative thinkers.

The greatest scientists are artists as well. Science in itself is a creative undertaking. Albert Einstein, in fact, what did he say? Imagination is more important than knowledge.

So I think I read somewhere that brain activity can be described as a neural concert where individual players have a stronger role during certain parts, but neither side of the orchestra sort of dominates. So just like a concert, practice makes better. And the brain is a mental muscle.

It is a muscle that can be stretched and people can improve their skills on both sides. Talking about innovation, there was a lot of buzz going around AI and hybrid intelligence. So do you think immersive technologies like virtual reality VR or augmented reality AR will facilitate creative exploration and visualization in science? And to what extent do you think would these technologies influence the creative processes within scientific research and innovation? Yeah, I'm glad you're asking this question, because I think pretty much anything that adds another dimension, oh, pun intended, you know, should help with the creative process, the process of ideation, visualization, collaboration, experimentation, learning.

Let's just take visualization, for example. I know I personally would benefit from visualization of complex 3D model data sets. I struggle with those because it's hard to imagine that dimension.

But if you can visualize that in space and see the simulation in an immersive environment, it'll be so much better. You know, the ability to visualize spatially will give more unique perspective because you'll have a deeper understanding of what you're seeing and how it manifests itself in the process of whatever it is you're doing. And that should foster, I think, more creative insights.

And honestly, it'll make it so much easier. It is so difficult to imagine that dimension on a piece of paper or your screen, but really, truly visualizing it perhaps makes it more more intuitive, more engaging. So that's just one.

It can also improve collaboration and ideation, especially in remote environments. So I think, all in all, anything that adds information can help the creative process positively. But of Course, you know, you have to have careful consideration of, of user experience, accessibility of these and ethical implications.

But I think it really opens up more space for that creative spark and what we at 3M call uncommon connections. When you actually see this, you know, come alive, how can we foster a culture of curiosity, open mindedness and creative risk taking in the scientific community? And to add on, are there any examples that you can think of on successful interdisciplinary collaboration that have fostered scientific creativity and breakthroughs? I don't know if I can mention even one that is not interdisciplinary. Like it's, it's so difficult to really do anything which doesn't involve and involve different disciplines.

So. And I truly believe that many of the advancements have and will come at the intersection of multiple fields. And at 3M, we see this all the time.

People with different expertise, different experiences, different experimental data come together and extraordinary things happen. You know, examples like external examples, CERN Particle Accelerator. Thousands of scientists, different fields.

Apollo Space Program, Biomimicry Institute, Coronavirus vaccine. Great examples of interdisciplinary collaboration. Human Genome Project.

Thousands of scientists, engineers, computer programmers and ethicists and lawyers, and everybody from different countries and institutions working together to map and sequence the entire human DNA. You know, and these kinds of ambitious interdisciplinary projects are really great because they advance the field for sure, but also new forms of collaboration, communication, data management, translation across disciplines. So I think that's, that's great.

So to answer your question, it takes a healthy relationship with failure to foster a culture of curiosity and open mindedness, right? But I think it is not very difficult for scientists. The scientific process itself is about iterating and if it doesn't work out, it isn't a failure. You learn something.

I wish more people thought that way. It's like, okay, that was the hypothesis. We tried this, it didn't work out, but we learned something.

And it is so much easier for scientists and folks in science who do higher degrees because you have to go do research into something that nobody has done before and then you have to defend it. So you are so comfortable with the fact that you are going to be doing something that nobody has exactly done and that allows you to be much more comfortable with risk. And this I realized only after I interacted with a lot of business people.

There is a more, I will say, risk averse behavior sometimes because they don't feel as comfortable as with risk as scientists do. I also think exposure is good. Exposure raises a lot of questions and questions are good for fostering that sense of curiosity.

I think providing opportunities for scientists to Explore novel ideas, scout different things, take on new roles, investigate different perspectives, interact with diverse perspectives. Just fresh insights always raise questions, you know, unfamiliar domains, new skills. And you know, an example is at 3m.

In many groups we do rotating job responsibilities, so a new scientist is exposed to new problems, new fields of knowledge to sort of simulate that curiosity and the divergent thinking. And then we also promote a lot of interdisciplinary collaboration and cross polish pollination of ideas by, you know, facilitating collaborations through a platform we call Tech Forum, where all technical people are constantly thrown together. You know, diverse disciplines around the globe and you can recognize the interconnectedness and sort of get a holistic approach to problem solving.

So that I think is important and some of the things that we can do to foster that curiosity. Sustainability and social responsibility in research has been on emphasis since 2023, thanks to the UN Sustainable Development Goals SDG. In the light of this changing scenario, in what ways do you see the role of a corporate scientist evolving in the coming years, particularly in driving these agendas? Oh, it's a strong role because I think most companies I know mine, we have adopted a lot of the frameworks and broken it down to what it means for us in terms of sustainability and social responsibility agendas.

So I think it's back to embracing a multidisciplinary approach. Addressing complex challenges like sustainability requires integrating knowledge from various fields, including as we talked about, social sciences. So we need to emphasize the real world relevance and applications, clearly articulate the practical benefits, and it should help with the public perception of science.

And communication is key so they can build trust and relatability by communicating their research in simple, relatable terms, sharing the human stories behind their work and how it helps the sustainability agenda. And that's what can bridge the gap between understanding with the public, which is going to be crucial for driving sustainability and social responsibility agendas. The public needs to be on board as well.

So I think again, it's about collaboration, it's about community, it's about partnership, and it is about really internalizing the goals in terms of the grassroots, in terms of what is socialized in the middle and what is demanded from the top. Thank you, Dr. Jayshree Seth, for this enlightening discussion.

As we move towards a future that demands sustainability and social responsibility. Your vision for the evolving role of corporate scientists is both timely and visionary. Thank you.

Thank you so much. And if people are interested, I write a lot about these topics in my books. And if you want to foster a sense of curiosity and creativity, go find them on Amazon and it is all for a good cause.

All proceeds go to a scholarship for underrepresented women in stem. So it's a win win. Education is the best gift we can give.

Yes, absolutely. One key point that I would like to leave for our audience as we wrap our session today is that fostering a culture of curiosity and creative risk taking not only acts as a key to innovation, but also bridges the gap between academic and common community. Through bringing what's wise and house under one roof, we can propel science forward and power groundbreaking innovation and this can help us decrease the gaps in knowledge.

Thank you.