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science

LET'S TALK ABOUT SCIENCE?

Discover the new programme of British Council geared towards promoting women in the world of science

THE REPRESENTATIVENESS OF BLACK WOMEN

If the access of girls and woman to scientific knowledge and an academic career is fraught with challenges, the difficulties faced by black women are even greater

A PLACE AMONGST THE STARS

Interview with Duília Fernandes de Mello, astronomer, astrophysicist and one of the most recognised Brazilian scientists in the world

BRITISHCOUNCIL

Wome

EDITORIAL

For centuries science has been considered a masculine calling. When we think of inventors and scientists, it is names like Isaac Newton, Charles Darwin and Alexander Fleming that quickly spring to mind. Women scientists, on the other hand, tend to exist in the shadows and are rarely cited with the same regularity as their male counterparts.

In part, this reflects the lack of opportunity for girls and women to build careers in science, maths and engineering. Gender stereotypes historically mean that fewer women than men have enjoyed the chance to develop their talents and follow their interests in science. However, any society that currently adopts this approach is simply underusing half of its available intellectual capacity.

There are many documented examples of women who have never been recognised for their contributions to science. One of the most notorious cases is that of Rosalind Franklin, a British chemist born in 1920 who was never recognised for her contribution to the DNA double helix, in the 1950s. The 1962 Nobel Prize for Physiology and Medicine was granted to Francis Crick, James Watson and Maurice Wilkins, leaving Rosalind out of the picture for almost half a century, when, finally, her efforts were acknowledged.

Today, there are many examples of women at the forefront of science: Sue Black, an internationally renowned information technology scientist; Lesley Yellowlees, the first woman to preside over the Royal Society of Chemistry, in the United Kingdom; and Sunetra Gupta, a famous epidemiologist, are examples of women among some of the most important names in science.

Our objective at the British Council is to recognise and promote female role models in science and show future generations the value of scientific careers

WOMEN IN SCIENCE

for women and girls. Brazil already has a higher number of women enrolled in higher education than men – both at undergraduate and graduate levels, but there is still room for progress, especially in exact sciences and in positions of leadership in academic field.

In November 2018, we announced the Women in Science programme at the Museum of Tomorrow in Rio de Janeiro, in parallel with the first Latin American edition of the WoW – Women of the World Festival. The British Council invited a delegation of women scientists from the United Kingdom to take part in the event.

Women in Science is aimed at encouraging girls and women to dedicate themselves to science, technology, engineering and maths at school and in university and to pursue careers in these areas.

Working together with our partners, we aim to promote the discussion on how to encourage wider participation among women in science and seek to overcome obstacles so that this does, in fact, become a reality, while strengthening ties between women scientists in Brazil and the United Kingdom.

I hope that this publication motivates the reader to reflect on the role of women in science, today and in the future.

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DIANA DASTE DIRECTOR EDUCATION SERVICES PHOTO: ROBERTO CHAHIM To talk about science means talking about curiosity and opportunity. It raises a torrent of questions and leads to transformations and discoveries. To talk about science means talking about structural, social, human and individual growth

ccepting the importance of diversity within science is crucial, as it provides insight into myriad perspectives, expanding the frontiers of knowledge. Science is also crucial to diversity, because when applied and relevant to different social identities, it results in development models that are richer, more inclusive and representative.

As such, it is vitally important to generate and support models that encourage diversity in the sciences, especially the exact sciences, and which incorporate a gender-based perspective with a focus on engagement, recognition and leadership among women and girls that practice science. Recognising these challenges and this potential, the British Council created the **Women in Science** programme, the aim of which is to leverage ties among women and girls – Brazilian and British – in the sciences, at both individual and institutional levels, in order to transform standards of influence and bolster leadership and gender schemes in the exact sciences.



The initiative, led by the British Council, is aimed at fostering more diverse and representative science through the exchange of experiences and expertise among women scientists and scientific institutions in Brazil and the United Kingdom, influencing the dimensions of interest, performance and recognition. One of the medium-term objectives is to consolidate the **UK-BR Women in Science Association** – an independent network of women scientists in both nations.

THE CHOICE OF TOYS – DOLLS FOR GIRLS, BUILDING BLOCKS AND CARS FOR BOYS –, FOR EXAMPLE, CREATES A MAJOR DIFFERENCE IN BUILDING STEREOTYPES. Despite substantial contributions to the world of science, women remain largely invisible (in numbers, recognition and influence) in STEM (science, technology, engineering and maths) fields. The reasons for this surpass social, cultural and structural dimensions, and occur at many points throughout the lives of these women, from infancy to adulthood.

From early on, when they have the opportunity to study, girls are encouraged to advance in careers more associated with care, while boys are motivated to engage in technical and scientific activities. In Brazil, there are currently more women enrolled in higher education – they accounted for 60 percent of university degrees in 2016, according to data from the Anísio Teixeira

National Institute for Educational Studies and Research – INEP. However, gender stereotypes associated with certain careers and a lack of references, form stumbling blocks that still keep women away from certain university programmes. Women are clearly underrepresented in the sciences, maths and computing

The choice of toys – dolls for girls, building blocks and cars for boys –, for example, creates a major difference in building stereotypes and in developing the confidence to try out certain activities. Teachers very often reproduce these patterns in the classroom. Additionally, there are very few female references in educational material, which makes it all the more imperative to develop viable models to deconstruct these stereotypes through recognition, experimentation, support and inspiration. At more advanced career stages, there is a clear imbalance in the distribution and influence of women. In Brazil, just one in four A1 senior researchers is a woman; A1 being the highest level among categories established by the **National Council for Scientific and Technological**

Development - CNPq. Furthermore, investments granted within productive research groups is up to 100 million more for men, according to the organisation Gênero e Número. This asymmetry attests to the many challenges faced by women in terms of scientific research and leadership, among them motherhood, prejudice and domestic chores, factors with a major influence on their careers in the work market in general and in the scientific environment in particular. These statistics are all the more disheartening for denoting systemic limitations to absorbing and using the scientific wealth generated by women in the country and around the world. According to data from UNESCO, just 30 percent of current STEM professionals and researchers are women. And this certainly does not boil down to a lack of capacity or competence. Spaces must be created for discussions that call for policies and initiatives that acknowledge the specificities and barriers experienced by women and that support the access, leadership and influence of women scientists. We also need to identify, support and build the capacities required to advance in this agenda.

TALKING ABOUT SCIENCE MEANS THINKING ABOUT THE MODELS OFFERED AS REFERENCES AND ABOUT THE ELEMENTS MOST OR LEAST CONTEMPLATED IN CONSIDERATIONS AND CONCLUSIONS

Women in Science will rely on the power of networks to bolster capacities and generate transformation. The programme is grounded in a multi-partner approach, recognising the need to combine forces, knowledge, competences and resources to construct the foundations for sustainable and autonomous projects.

Discussing science means thinking about the models offered as references and about the elements most or least contemplated in considerations and conclusions. We discuss science and pose questions on the issue in order to reach a resolution.

This publication is the first of many that will document debates, achievements and other elements in developing a network of Women in Science and their contributions to more representative, diverse and richer scientific practice.

Let's talk about science? You're welcome to join us!

BY ANA PAULA MORALES PHOTO: DIVULGAÇÃO

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Around the world women still only account for under 30 percent of researchers in all areas

n the past century, women have been carving out space for themselves in social, political and professional fields that, for so long, were restricted to men. Many advances have been made, and female figures now occupy leadership roles in several sectors of society. In certain settings, however, gender equity is still a distant reality, with many challenges to overcome. "The world of science is no exception – many achievements have been made, though they require more visibility, due to falling within a universe historically dominated by men, especially within the STEM (science, technology, engineering and maths) areas", said Diana Daste, British Council Director Education Services

In Brazil, despite women representing 49 percent of total national scientific production, according to data by Elsevier published in the study "Gender in the Global Research Landscape", data analysis, when separated by area, reveals a very different scenario. While Brazilian women are the majority in health, corresponding to 73 percent of the researchers in nursing, for example, in the exact sciences the situation is inverted: they account for just 29 percent of engineering researchers. Around the world, women still only account for under 30 percent of the researchers in all areas. With this scenario in mind, the British Council created the **Women in Science** programme, aimed at strengthening ties between girls and women in the sciences. The focus lies on exact sciences, to transform the patterns of influence and encourage leadership and gender equality. According to Daste, project coordinator, the motivation behind the creation of the programme arose, on one hand, from an internal context, as equity, diversity and inclusion are an integral part of the institutional values of the British Council and permeate its actions through several of its programmatic platforms, such as basic education, English language, higher education, sciences, the arts and creative economy. On the other hand, it was kick-started by an "external context, related to national and international reality concerning the recognition and insertion of women in science", she explained.

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We believe that the recognition of the work of women scientists also generates inspiration

Diana Daste, British Council Director Education Services

FROM EARLY ON

The programme was established following a study by the British Council on legislation, public policies and the institutionalism of the issue of female representativeness in Brazilian science. Based on empirical data, the study identified the challenges that arise throughout the lives of girls and women and outlined opportunities for acting on three fronts – interest, performance and recognition.

"If we consider the phases of life on a timeline, the first of these challenges is the lack of inspiring models and a sense of girls being steered away from the sciences", said Ms. Daste. According to the study published in a 2017 edition of Science Magazine, from six years old, girls begin to believe they are less intelligent than their male colleagues – up until that age they believe they are equally intelligent. This type of negative perception in relation to their own gender may be an influential factor in performance and in the choices of youths throughout their lives. According to the 2015 Programme for International Student Assessment (PISA), even when presenting higher performance, girls show less self-confidence in their abilities to solve maths and science problems than their male colleagues of the same age.Regarding professional choices, fewer than five percent of girls plan to follow a career in engineering or informationtechnology – the index is four times higher among male youths.

According to Luis Felipe Serrao, senior manager of basic education for the British Council, the institution has developed actions to train professors and leverage discussions about school curriculum. as part of the Core Skills programme. This involves discussing the teaching of science while working on essential competences such as critical thinking and digital literacy, among others. "Our effort is geared towards different school subjects, considering gender views, too. This includes introducing material that carries these references [of women in science] and also helps teachers to undertake a more determined approach to engaging girls in the varying fields of the exact sciences", she said.

GLASS CEILING

One of the main points of focus for the Women in Science programme is the consolidation of a network of key actors from Brazil and the United Kingdom – the UK-BR Women in Science Association

– aimed at involving women scientists through joint initiatives and the exchange of experiences involving gender and leadership. Besides professional and study exchange programmes, plans include symposiums, round tables and policy dialogues to discuss issues related to women in science. "We want to approach the subject from within academia, and also take it to a wider audience. We believe that the recognition of the work of women scientists also generates inspiration", stated Ms. Daste.

The development of capacities and leadership is one of the focuses of the programme, as the proportion of women tends to fall as the hierarchy in scientific careers increases. Explained differently, women represent 60 percent of those who complete undergraduate programmes, according to data from the 2016 Higher Education Census, prepared

by the Anísio Teixeira National

Institute for Educational Studies and Research – INEP. Despite being higher in undergraduate numbers, the numbers begin to fall in more advanced stages of the academic career: female representativeness among all the research production grants provided under the

National Council for Scientific and Technological Development (CNPq)

was just 35.5 percent in 2015. Reaching further to the top of the career ladder, the numbers fall even more – just 25 percent of the researchers in a CNPq senior category are women. Some actions are already being developed by the British Council, like offering training to minority groups in certain areas of science. In 2017 and 2018, two rounds of the Master's Study Grant programme for Groups Underrepresented in Science in Brazil were launched through the Newton Fund, a British government incentive aimed at the social and economic development of partner nations, through research, science and technology. Of the 13 grants in the period, 70 percent went to women.

> GENERALLY SPEAKING, THERE IS GENDER EQUALITY IN THE DISTRIBUTION OF CNPQ GRANTS, BUT AS YOU RISE THROUGH THE LEVELS, THERE IS LESS AND LESS FEMALE PRESENCE

35,5%

In the research production category (above PhD)

1 in 4 researchers from the Senior category (level A1) is a woman

Source: Gênero e Número

INITIAL KICK-START

The **Women in Science** programme was announced in November 2018 in Rio de Janeiro, at an event in parallel to the WoW - Women of the World Festival. "The forum selected for the announcement [of the programme] was wonderful, as we had the opportunity to welcome women from all over Brazil and the rest of the world, who all contributed to the discussion. The space allowed us to explore these women in science from several angles", stated Nina Best, Senior Manager Society.

Founded in 2010 by Jude Kelly, then artistic director of the Southbank Centre in London, the WoW Festival first arrived in Latin America after having visited 23 countries in Europe, Asia and Africa. In Brazil, the event was organised by the WoW Foundation and a community-based organisation from Rio de Janeiro called Redes da Maré, with the support of the British Council. The Brazilian edition included many talks, sharing of career paths, workshops and an intensive artistic and cultural programme - all conceived to celebrate the achievements of women and to promote discussion about the challenges in reaching gender equality in the most diverse aspects of modern life.

WOMEN ALREADY MAKE UP HALF OF THE PRODUCTIVE FORCE IN SCIENCE IN THE COUNTRY

However, distribution per area is still unequal:

73% of researchers in nursing are women

29% of scientists in engineering are women

Source: Gender in the Global Research Landscape

One of the contributions by the British Council, within the scope of the **Women in Science** programme, was to introduce an agenda at the festival focused on the issue of women in science. On a wider scale, the institution supported several meetings that took place in different parts of Rio de Janeiro throughout the year prior to the event, to discuss the topics for the debate panels. "The methodology for the festival is geared towards inclusive curatorship, through these meetings, listening to the demands of women from the city included in the festival programme", stated Nina.

As part of the pre-festival programme, the British Council, in partnership with the Museum of Tomorrow, hosted a science communication training session with 15 women – including STEM researchers and journalists/science communicators – from every corner of the country. One of the workshop activities looked to document the WoW Festival's scientific agenda through news articles, interviews, videos and podcasts (the content in this magazine is the result of this activity).

According to Meghie Rodrigues, a researcher on the Board of Scientific Development for the Museum of Tomorrow, the leading capacity building objectives were to provide women that do science with more visibility, to promote better scientific communication practices and to open their eyes to gender-related issues deeply seated in the world of science. However, the intense exchange of experiences among participants opened avenues even further. "In my mind, the strongest point of the training was the creation of a network. The activities served as a focal point around which they came together and leveraged the commitment they already had with the women in science agenda", she said.

The partnership with the Museum of Tomorrow is already a staple of previous British Council actions, and the goal is to strengthen and expand within the context of **Women in Science**. According to Ms. Daste, "one of the premises of the programme is to establish multi-partnerships with groups and institutions with complementary traits and that can enrich the project with expertise, financial support and legitimacy. There are several institutions suited to more than one of these categories", she argued. Following the success of the first experience, the capacity building actions in science communication for women will remain on the programme agenda.

According to Daste, the importance of engaging them in the promotion of science touches on the "issue of visibility, while also bolstering capacities and facilitating scientific career advancement for women", as a means to develop communication not only amongst peers, but with the wider public, too. As such, the aim is to provide the tools that will allow women to carve out new spaces. "This intervention was focused on women, but its impact is far greater and touches on the diversity and wealth of content generated, something that benefits us all", she ended.

"

A study shows that girls begin to feel less intelligent as from the age of 6

Source: Science



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SCIENCE, SOMMUNICATION AND WOMEN IN NETWORKS

BY PATRICIA SANTOS PHOTOS: GABI CARRERA

Three moments when a workshop went beyond educating women scientists and science communicators

> Inspiring girls to follow science-based careers, changing stereotypes within scientific professions, shedding light on the achievements of women researchers. These are just some of the challenges faced when discussing gender and academia and, among them, there is a common need: a new perspective on how science is communicated.

Aimed at fostering debates and building capacities, the British Council hosted a workshop on science communication on November 14 and 15, 2018. The activity was part of the pre-programme for the WoW - Women of the World Festival, staged in Rio de Janeiro, from November 16 to 18.

The workshop involved 15 women from all over Brazil, selected through an open call: eight women scientists from STEM (science, technology, engineering and maths) areas with no experience in communication, and seven professionals already active in science communication.

Held at the Museum of Tomorrow, the event went far beyond capacity building. It represented yet another seed in leveraging the discussion about gender and science, merging the perceptions of women scientists and science communicators from the north to south of Brazil and, above all, showcasing the importance of connections among scientists, women and the general public with regards to this issue. More on some of these moments:

1. RETHINKING COMMUNICATION

The workshop was split over two days, the first led by British researcher, presenter, author and comedian Timandra Harkness. Employing interviewing techniques and public presentations, the idea was to encourage participants to formulate strategies for this type of communication, while keeping in mind the type of audience, verbal and non-verbal aspects, duration and format. Ms. Harkness also spoke of the importance of the narrative when looking to engage the public in science-related issues. Offering tips to buttress confidence and fluency whencommunicating, some of the participants tried adding an emotional tone to their presentations, while others employed humour, among the many other creative possibilities to communicate science.

While these exercises were undertaken, women scientists and communicators were asked to identify what they could learn from their colleagues' presentations and provide critical and constructive feedback to each other, to ensure not only individual evolution, but group evolution, too.

> IT GAVE RISE TO A FEELING OF WANTING TO BREAK AWAY FROM MY PLACE OF COMFORT WITHIN TRADITIONAL MEDIA AND TO OCCUPY OTHER COMMUNICATION SPACES Alessandra Brandão



2. SPACES TO CONQUER

The second day of the workshop was led by Mariana Fioravanti, a biologist and science communicator specialised in social media. Following a survey about how social media is currently consumed and about the potential of different platforms, Ms. Fioravanti presented cases and concepts, and discussed strategies for the production of communication content.

"It gave rise to a feeling of wanting to break away from my place of comfort within traditional media and to occupy other communication spaces. When I get back, I'm going to mobilise my team of grant students in order to participate more effectively in the social media we are creating for the projects", stated Alessandra Brandão, a journalist and university professor. The sense of discomfort mentioned by Ms. Brandão was apparent in the discourse of other participants. As the workshop introduced new information or led participants to review past concepts, it also provoked reflections about gender, race, social and territorial conditions, how women differ in their approach to science and which of these aspects bring them together and strengthens them.

"I was with so many wonderful women, with common objectives. I've never felt as free or safe. But, at the same time, I also felt really sad when I realised that not everyone is as immune to aggression and prejudice as I am", stated entomologist and science communicator Rafaela Lopes Falaschi. She highlighted the importance of a connection among women: "each of us is providing emotional support to the other".



3. MODELS, PARTNERSHIPS AND INSPIRATION

Following the workshop, participants were tasked with doing the press coverage of issues related to the science part of the 2018 WoW Festival programme. The topics launched by the organisers for this press coverage took a similar line to the discussions that permeated the capacity building initiative.

How to reconcile a career in science and motherhood; places for disabled, transgender and black women; points of convergence or divergence among women from different countries when it comes to science; how science (and women scientists) can help break stereotypes linked to gender and reduce inequality between men and women. These and other subjects were suggested to the participants.

Working in groups, participants selected their agendas and production formats – video, text or audio – generating the majority of content you will find in the pages of this magazine. The interaction among scientists, communicators and women taking part of the most varying repertoires and from different parts of Brazil and the world went far beyond the produced materials, as explained molecular biologist and science communicator Bárbara Paes. "I alimpsed how the world could be while here in Rio de Janeiro and now I want it all, for myself, and for all the women and girls here. It's going to be tough for whoever decides to get between me and everything the world has to offer. And that goes for the rest of us, all of us. I wish the men good luck, because we don't need it. We have each other".





Physicist Priscilla Andressa de Souza Silva, assistant professor for the aeronautic engineering programme at São Paulo State University (UNESP), in São João da Boa Vista, São Paulo state, was the winner by popular vote of the Brazilian stage of FameLab 2018 – an international science communication competition created by the Cheltenham Science Festival and organised in 32 countries by the British Council.

he was the only representative of the exact sciences among the finalists. Having studied at the Federal University of Pernambuco (UFPE), she earned her PhD at the Instituto Tecnológico de Aeronáutica (ITA; Technological Institute of Aeronautics) and was invited to participate at the 2018 WoW – Women of World Festival to contribute to the conversation on "Women in science and the power of working in a network". In her talk, she spoke of the importance of connections. In this interview, Ms. de Souza Silva showcases science communication by women and reiterates how capacity building through FameLab optimised her work as a communicator. "We have to build the bridge, present it to people in a way that is comprehensible, allowing them to understand what we are producing at the universities", she said. FAMELAB HELPED ME UNDERSTAND THAT I NEED TO THINK LESS ACADEMICALLY ABOUT MY PRESENTATIONS AND MAKE THEM MORE INCLUSIVE, BECAUSE AS SCIENTISTS, WE TEND TO SPECIALISE IN SPECIFIC SUBJECTS

WHAT BROUGHT YOU TO THE WOW -WOMEN OF THE WORLD FESTIVAL?

MS. DE SOUZA SILVA: It was the opportunity to participate in an event that deals with women's issues in several areas – the arts, in culture, in the sciences. As I coordinate a university extension project called Science in the Feminine, which visits schools and encourages girls to develop careers in areas like engineering and the exact sciences by showcasing female examples, female models of success, I thought this would be the perfect setting to listen, speak and exchange experiences about this subject, which is so important to us women scientists.

WHAT LED YOU TO SCIENCE COMMUNICATION?

MS. DE SOUZA SILVA: When I completed my PhD, I spent about five years doing a post-doctorate. At that time, I never had contact with undergraduate students, in the sense of teaching, of passing on basic knowledge garnered early in our careers. I worked with graduates, people with a certain level of scientific maturity, and when I passed the public competition at UNESP, my first few classes were with firstyear students. I was very concerned about using the right language, because they were there to gain technical, scientific, theoretical and experimental knowledge that would form the pillars of their careers. I tried to use language to reach them, and this naturally led me to science communication. While I understand that undergraduate teaching and laymen communication are two different things. I find they both follow a system in terms of what you're discussing, different to the way we speak at a scientific conference in front of an audience of our peers, who possess technical knowledge.



YOU WERE THE WINNER BY POPULAR VOTE OF THE NATIONAL STAGE OF FAMELAB 2018. DESCRIBE THE EXPERIENCE. MS. DE SOUZA SILVA:

While I was teaching first-year engineering students, I received an institutional e-mail promoting a science communication contest called FameLab, which I confess I had never heard of. I submitted a video, signed up and ended up being selected amongst thirty semi-finalists. I then made it to the final and won in the popular vote category. So 2018 was truly a year of discovery for me – I hadn't been involved in science communication prior to that and, suddenly, all of this happened. It has become a subject that is extremely relevant to me, something I will certainly explore throughout my career.

HOW HAS FAMELAB HELPED YOUR WORK? MS. DE SOUZA SILVA: Everything I

learned during FameLab was important, but it was only the start. I think what I learned most at FameLab, and in the discussions, was that I need to think less academically about my presentations and make them more inclusive, because as scientists, we tend to specialise in specific subjects. It begins with scientific initiation, then moves on to the master's degree. and then the PhD - it funnels down. When we finally arrive at the post-doctorate stage, we are specialists in an extremely language in our field, too. So, the main gain at FameLab was acquiring the skill to go back to my scientific initiation, when I still hadn't acquired such technical language, and be able to speak about a subject that I know more intimately in a

those lacking technical expertise. I think this is the main skill I began to develop at FameLab. I believe the second would be to see the presentation as something organic. Before this, I was never taught to prepare a presentation using storytelling techniques or stepping stones (where you don't memorise your presentation, but pass through a series of important points instead), which are resources that we can even apply in highly specialised communication, not only in science communication for the general public or promotional purposes.'

These are lessons I have already put in practice, and I really think that they have helped improve my classes! That wasn't the aim of FameLab, but I think it made me realise more about what I was saying, and this may have improved my classes a little.



UNFORTUNATELY, ACADEMIA PRESENTS MANY OBSTACLES TO WOMEN'S GROWTH [...] I BELIEVE THAT KNOWING HOW TO COMMUNICATE, BOTH AT AN ACADEMIC LEVEL AND WITH THE GENERAL PUBLIC, IS ONE OF THE KEYS TO CHANGING THIS REALITY

WE MUST BE ABLE TO GIVE FEEDBACK TO SOCIETY ABOUT WHAT WE'RE DOING

WHICH SCIENCE COMMUNICATION PROJECTS ARE CURRENTLY TAKING UP MOST OF YOUR TIME?

MS. DE SOUZA SILVA: After FameLab, I began recording a few videos for YouTube, which is a little complicated due to the lack of time. Our teaching career at university branches into several directions – besides teaching, there is research, extension programmes and the administrative aspects, wherein we provide support. So, it is tough to find time, but whenever I can, I prepare material and gradually record videos for YouTube. I have a channel called Curta Ciência – I hope to give it a little more attention soon and continue my work as a communicator for the mass public. Additionally, the FameLab group met up and put together a science communication event, headed by Professor Breno Salgado, from the Federal University of Espírito Santo (UFES). There are also a few other projects that I'm developing - for example, I'm involved in the organisation of an Engineering Week on campus. These are things that have been triggered inside of me because of science communication. Another project that I'm very fond of is Ciência no Feminino (Science in the Feminine) which has actually been around since before FameLab, but has since embraced the fact that it, too, is science communication. Despite the project being geared towards empowering the role of

women in science, shedding light on the names of women who are scientists yet remain unknown, I think it took on a new dimension when I stepped into the world of science communication. After FameLab, the project has really embraced this notion of communicating, of taking science to high school students.

WHO IS THE TARGET AUDIENCE FOR THESE PROJECTS?

MS. DE SOUZA SILVA: For the extension project, our target audience is generally high school students, living in precarious socioeconomic conditions, and with a focus on girls. Obviously, boys are also welcome. They also participate with us at our meetings, the lectures, projects and in biographical research. Through these studies, we work with students to discover more on the lives of women who have left a relevant mark in science. That way, we get them to produce and take interest in research. So, it's not something we teach through lectures; we hand it over to them to do. Besides that, the YouTube channel, as well as the rest of my communication efforts, are all aimed at the lay public. I try to use language that can be understood not only by people interested in science, but also those not that interested in the area, people who don't know what it is or how it works, or even what it's for.



WHY DO YOU FEEL IT'S IMPORTANT TO KNOW HOW TO COMMUNICATE SCIENCE?

MS. DE SOUZA SILVA: I believe that knowing how to communicate is extremely important for any professional, in any area. This is true for scientists, too, especially because here in Brazil we are mostly funded by public agencies. In other words, the money that supports our research comes from public contributions. So, we have to be able to provide society with feedback on what we're doing, our feedback is not about talking, it's about producing, but this information must reach the community in terms that are understood. The majority of people here in Brazil are completely disconnected from what scientists are doing, and I feel it is our responsibility to close this gap. We have to build the bridge, take information to the population in a way that is comprehensible. allowing people to understand what we are producing at the universities.



DO YOU FEEL IT IS IMPORTANT FOR WOMEN SCIENTISTS TO ENGAGE IN SCIENCE COMMUNICATION?

MS. DE SOUZA SILVA: In the exact sciences, there are generally fewer of us. So, to showcase our work, to make it known on a wider scale, we need to promote it both within academia and amongst the general public. Unfortunately, academia presents many obstacles to women's growth. There are still very few of us in many areas, especially the exact sciences, and we have less access to grants and funding than our male counterparts. There are fewer women in prominent positions, or seats of power in universities. So, I feel that knowing how to communicate, at an academic level and with the general public, is one of the keys to changing this reality. It's going to be a long road, but women need to rekindle this interest in telling stories. To talk about our efforts, about our work, in a way that people understand and so that they recognise us for the professionals that we are, women scientists.



BY RENATA FONTANETTO, WITH THE COLLABORATION OF ÉRICA DE MELLO SILVA

FACE TO FACE WITH A

When Brazilian scientists and the public are in close contact, dialogue and inspiration flow



THE NIGHT SKY IS MY LABORATORY Karin Menéndez-Delmestre, astronomer from UFRJ

^{photo:} Renata Fontanetto

WOMAN SCIENTIST

MANY OF THEM [GIRLS] FEEL THAT THIS WORLD OF SCIENCE IS OUT OF THEIR REACH. I INVITED IRINA [A PHYSICIST] TO CHAT TO MY STUDENTS ABOUT THESE ISSUES

Ana Beatriz da Silva, teacher at a state school in Rio de Janeiro

The dynamics of the situation are much like musical chairs. Imagine eight women scientists seated beside each other, waiting to be approached by curious members of the public. Placed in front of each of them is an empty armchair, waiting to be occupied. In total, 16 seats form eight pairs and comprise a harmonic row in the activity "Chat with a women scientist", part of the programme for the **WoW - Women of the World Festival**, held in Rio de Janeiro, in November 2018. The Brazilian women scientists were presented by journalist Meghie Rodrigues, a researcher for the Board of Scientific Development for the Museum of Tomorrow, given the task of introducing each researcher. The names carry much weight: biologist Marília Zaluar, particle physicist Irina Nasteva, astronomers Karín Menéndez-Delmestre and Erika Rossetto, culture Leinimar Pires, biomedical scientist Gabriela Nestal, astrophysicist Josephine Rua and ecologist Maria Alice Alves.

Once it begins, a member of the public selects their scientist, gets comfortable and asks anything for 15 minutes. Once time's up, a new researcher takes her place and the process starts again.

The conversation generally begins to flow from the ice-breaker question "What do you do?". Astronomer Karín Menéndez-Delmestre reveals to a mother and daughter that there are physicists that prefer theory, while she enjoys observational research. "I observe distant galaxies and then study what I observed in the university laboratory", she explains. According to Ms. Menéndez-Delmestre, who studies the formation and transformation of galaxies at the Federal University of Rio de Janeiro (UFRJ), the night sky is her "laboratory". One of the astronomical events she observed, for example, include systems headed towards collision, like the Milky Way and Andromeda galaxies, our closest neighbour. "But don't worry. This is only set to happen around four billion years from now", says the researcher to her smiling and attentive audience.



The mother and daughter part of the conversation are Cirene Ribeiro and Mariana Ribeiro, respectively. At 14 years old, Mariana simply loves the reality TV show MasterChef and has already shown a passion for gastronomy. Attentive to the future of her daughter, Cirene likes to encourage reflection about different professions and is accompanying Mariana on this journey of discovery. There is one profession that she especially admires: teaching. "People often say they would not go to university to become a teacher because of the low pay. But if no one wants to be a teacher anymore, how will things end up?", asks Cirene.

SHE GAVE ME ADVICE AND SAID "KEEP PUSHING FORWARD BECAUSE ACADEMIA IS THERE FOR PEOPLE FROM MARGINALISED AREAS, TOO Carolina Marinho, 31 A few chairs down, physicist Irina Nasteva chats with **Ana Beatriz da Silva**, a teacher at a state school in Brás de Pina, in the northern district of Rio de Janeiro. In her opinion, it is essential to stimulate the participation of girls in the sciences. "Many of them feel that this world of science is out of their reach. I invited Irina [a physicist] to chat to my students about these issues. She told me that in her graduate class, there was only her and one other woman in the entire class", says Ana, who also develops research on race and gender related issues.





OUR CITY REALLY NEEDS OPPORTUNITIES LIKE THIS. SOMETIMES YOU CAN BE IN DOWNTOWN RIO AND AN AMAZING WOMAN MAY PASS BY AND YOU'LL NEVER KNOW WHAT SHE DOES

Carla Fabiana, 27

Nearing the end of the session, Ms. Pires was surrounded by five women who had listened carefully to her discuss whether or not philosophy is a science. "If we're talking about exact knowledge, like maths and physics, philosophy is not a science. We need to look at philosophy from the context of human sciences: yes, philosophy is a science and lies within this enormous area of human sciences", explains Pires, who describes herself not only as a philosopher and student of literature, but also, as a feminist brewer. Together with other women, she is responsible for the group called Coletivo Cerveja da Mulher Guerreira, focused on craft beer production. As a black intellectual, Ms. Pires also notes the importance of black groups so that students don't feel isolated in academic environments and do not allow any racist undertones to go unnoticed. "Having black professors is also very important. I never had one", she recalls.

The format of the activity really pleased Carla Fabiana, aged 27, and Carolina Marinho, 31, acting as mediators at at WoW. They took advantage of theopportunity to chat with the researchers. "You can sit there and chat with your idol. Our city really needs opportunities like this. Sometimes you can be in downtown Rio and an amazing woman may pass by and you'll never know what she does", points out Ms. Fabiana, graduated in psychology. Ms. Marinho, who studied language and communication, was overjoyed with her conversation with Ms. Pires. She feels that there isn't much opportunity for a woman from a marginalised area to sit next to a woman scientist studying astrophysics,

for example, or with women with such distinguished careers and trajectories. The exchange with Ms. Pires has encouraged Ms. Marinho to think more confidently: "She gave me advice and said, 'keep pushing forward because academia is there for people from marginalised areas, too".



Leinimar Pires, philosopher, student of literature and craft beer brewer









BY ALICE MARTINS MORAES, BÁRBARA PAES AND RAFAELA LOPES FALASCHI ILLUSTRATION: ANDRESSA MEISSNER

GENDER STEREOTYPES THROUGH THE **EYES OF CHILDREN**

What does a scientist look like? We asked girls and boys what they thought of the subject – and only the sky was the limit to their imaginations



s science a future option for girls? According to UNESCO's Institute for Statistics, only 28 percent of the world's researchers are women. And, even considering advances with time, women remain underrepresented, chiefly in the areas of science, technology, engineering and maths – STEM, and especially in research leadership positions. It's not that they don't exist or are not involved in science. It's that as the positions rise, the representativeness of women falls.

Studies show that one of the reasons for this imbalance is the construction of stereotypes linked to gender that even involve science itself. A 2017 Swiss study with 1327 students, published in the science magazine Sex Roles, showed that the sensation of "social belonging" guided the choice of more men towards careers in STEM areas and more women towards areas like healthcare, basic education and domestic life, even in a country with higher gender equality.



But what exactly is "social belonging"? According to the study, adolescents felt they fit in better in areas where there was a predominant presence of their own genders. And, in a type of vicious cycle, girls still seem to succumb to stereotypes of not being as able as boys in STEM areas, despite having done better than boys in all school disciplines.

"

A scientist is someone who discovers interesting things. They create formulas, discover things on other planets, create vaccines to prevent diseases, they have telescopes to watch the stars and meteors, and people too, sometimes. They wear clothes like doctors, those big white coats. People have all types of hair, so you can't tell by their hair. I could be a scientist, because I want to help people, discover things that no one can explain or identify. You look like a scientist, because of your glasses.

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This type of perception can begin a long time before entering university, while still at a stage of early school life. Another study published by North American researchers in Science magazine, in 2017, revealed that girls aged five have the same probability as boys saying that "girls can be very, very smart". From six years old onwards, however, they begin to believe that brilliant minds are far more likely among boys. At the same age, the girls developed greater interest for games for children "that work hard", than those for children "who are very intelligent". Again, the phenomenon occurs even when these girls show better performance in school subjects than their male classmates.

At what stage are these girls taught that they cannot do as much? At the 2018 WoW - Women of the World Festival, all the participants were invited to discuss equality between men and women, even the children. At the workshops called "Playing and building gender equality", girls aged 6 to 10 and boys aged 8 to 10 were separated into groups and invited to play house. During the activity, the children were encouraged to reflect on what a family is and share what they are told they can or cannot do as children, girls and boys.

For boys, they can play with dolls, but simply don't. Everyone can play with what they like. There's no problem crying, everyone cries. There is no problem with hair, no problem with clothes – "but playing football in a skirt must be hard", they felt. The girls weren't as convinced. They hear that "girls shouldn't be silly, they shouldn't be messy, they shouldn't play with balls, ride skateboards, and play video games, they can only play with dolls and do their makeup", while boys "cannot paint their toenails". "That's sexism", argues one of them, already familiar with the terms of the discussion.

We observed the dynamic from afar, paying close attention. We then interviewed the children to find out their perception of a scientist. Upon being encouraged to describe the image of a person that conducts research, we obtained diverse responses, with soaring imaginations. Ana Clara, dark-skinned, black hair and dressed in blue. José, aged 8, thought of a male scientist with hair standing on end and dressed in white. While the children expressed themselves and met women scientists, the debate on gender stereotypes in science was present at several points throughout the 2018 WoW Festival. And between dialogues, exchanges and games, the perceptions that still affect our girls and society are deconstructed, slowly but surely. By what we understood from the wisdom of these children, it seems we have a promising future.

"

I like science. I'm really smart, my mum and dad said so. I think scientists do a bunch of different things, things that people think are very different. I'm not sure about the hair, I think you could have any type of hair. I'm not sure about the clothes, either. I don't know any scientists.

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IS ENGAGED PATERNITY FOR THOSE WHO WANT IT OR THOSE WHO CAN ACTUALLY ENGAGE?

Daniel Lima, psychologist

The quest for equality between men and women touches on a reflection and redefinition of concepts regarding the role of both in society

BY ÉRICA DE MELLO SILVA ILLUSTRATION: ANDRESSA MEISSNER

he fight for gender equality shouldn't only involve women – men also need to engage. The contributions women can make to science, technology and innovation, besides the promotion of better living conditions and genuine social justice, are countless. To ensure these advances actually occur, however, we need to begin by raising awareness amongst men of the importance of their participation in building a more equal society. And this process necessarily involves redefining masculinity. "It's hard to bring men to the table to discuss gender equality because they fear losing their masculinity and power", affirms psychologist Daniel Lima, participant of the round of conversations on the subject held at the 2018 WoW – Women of the World Festival, in Rio de Janeiro.

At the event, several men shared their experiences and the difficulties faced in the daily lives of people that, like them, have joined forces with women in the common struggle for gender equality. In an attempt to overcome these challenges, Mr. Lima works on the issue with his peers through paternity. In his view, while the path of revolution for women involves occupying the world of work, fighting for space in a traditionally masculine environment, the revolution for men should begin "inside families and involve emotions". Lima believes that for this to effectively happen "it is necessary to change the paradigm of what 'strength' really is to men". In Skowronsky's vision, men need to realise that embracing their emotions and caring for the family as much as women is actually a demonstration of strength.


Avanildo Silva, agronomist and activist, points out that "standing beside women is a challenging path". In his opinion, besides brazen sexism, women living in rural regions of Brazil's Northeast face other myriad forms of oppression due to being from the Northeast and also being largely black. Cultural producer Henrique Gomes feels it is still very difficult to establish a dialogue with friends when it comes to feminism and says he has even lost work for tackling the subject. But he refuses to give up: "I am manifesting my views on this issue more regularly". In his opinion, "men are slowly joining [the cause of feminism], but we are far from this becoming a mainstream attitude with them". One of his biggest concerns is regard to the future of his daughter in the face of this rising wave of conservatism. One hope, according to Gomes, is the importance that female protagonism has gained in programmes like *A Maré que queremos*, a project that combines campaign actions in the community of Rio de Janeiro that have a direct impact on the quality of life of residents and of which he is part.

Standing beside women is a challenging path

Avanildo Silva, agronomist and activist

PUBLIC AND PRIVATE

However, deconstructing firmly established concepts within society with regards to what it means to be a man or woman is no simple task. To attorney Sandra Valle, this theme "should be discussed within political spaces through which our lives are governed". In full accord, Lima questions: "Is engaged paternity for those who want it or those who can actually engage?". The psychologist reminds us that social conditions are also determining factors – poor men, for example, very often don't have the time to spend with their families due to their long working hours. "It's a lot easier for white, middle class men, but the government needs to provide conditions so that they can all assume this role", he says.

Is your public discourse the same as your daily routine?

WoW Festival

Men are slowly joining [the cause of feminism], but we are far from this becoming a mainstream attitude with them Henrique Gomes, cultural producer Upon bringing a close to the round of conversations, WoW Festival founder, Jude Kelly, invited participants, both men and women, to consider the following question: "Is your public discourse the same as your daily routine?". She confesses that she doesn't consider her own discourse in favour of gender equality fully consistent with her daily attitudes. "Women are still trying to accommodate men's power", she reflected, in the sense that it's difficult for women to even break away from such a deeply entrenched sexist culture. Regarding this difficulty, Jude reiterates the importance of maintaining public and private attitudes on the same path towards achieving comprehensive gender equality, which includes women's participation in science.



BY VANESSA BRASIL ILLUSTRATION: ANDRESSA MEISSNER

Brazilian scientist Joana D'Arc Félix de Souza is a specialist in reusing waste from the leather-footwear industry for the production of goods in the areas of biology, health, chemistry, livestock farming, renewable energies and civil construction.

uring her formative years, she spent time at renowned national and international institutions, such as the state University of Campinas (Unicamp), where she earned a bachelor's degree in chemistry and developed her doctorate research. She also studied at the University of Harvard in the United States, where she completed her post-doctorate. She is currently a professor and coordinates a technical programme on tanning at the Prof. Carmelino Corrêa Júnior State Technical College in the city of Franca, in the interior of São Paulo state, where she develops research projects with youths in situations of social vulnerability. Throughout a career that spans nearly 30 years, she has earned over 80 awards, the most noteworthy being the Kurt Politzer Technology Award for "Researcher of the Year", in 2014. In this interview, Ms. Félix de Souza reveals that her biggest source of pride is participating in and transforming - the lives of her students.

A CONTRACTOR

WHAT DO YOU CONSIDER THE HIGH POINT OF YOUR CAREER THUS FAR?

MS. FÉLIX DE SOUZA: It was when I began to realise that it was possible to transform those youths involved in drug trafficking and prostitution. That's when I realised that my work was important, because I was changing the lives of these youths. When I began developing this project at the school [with youths in situations of social vulnerability], I had just returned from the Unites States. There were seven scientific initiation grants that were distributed among youths involved in drug trafficking and prostitution. After three weeks, a boy aged around 14 approached me, saying that they had no hope for the future. Fourteen is still a child! He was desperate. He walked into my classroom and said: "Professor, can you organise one of these grants like other kids are getting? I live amongst drug traffickers and I owe them. I've already taken a bunch of stuff from my mother to pay them, but I need another five Reais. They said that if I don't pay them by tonight, they'll kill me". He told me this story and I wasn't sure if it was true or not, but I gave him the five Reais and told him he'd have to apply for the grant, which would take between three and four months. The next day, I walked into the school and the director said to me: "Joana, there is a boy here that doesn't want to come into the classroom. He said he works for you and wanted a broom to clean the school". I realised he was making so much effort to escape that life that I ended up requesting the grant. While we waited for the grant to arrive, I paid for everything. It was one of the best investments I have

ever made, because, today, that boy is doing his doctorate in chemistry at the University of São Paulo – USP, in Riberão Preto. This example clearly demonstrates the power of scientific education in transforming lives. I think that was one of

AND WHAT HAS BEEN THE MOST DIFFICULT MOMENT IN YOUR PROFESSIONAL CAREER?

I saw just how important my work was.

the happiest moments in my life, because

MS. FÉLIX DE SOUZA: There have been many. The first, when I was doing my post-doctorate around a year and a half ago, within a month both my sister and father passed away. Later, in the last six months of my post-doctorate, my mother fell ill and passed away. That was last year.

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44 I REALISED THAT MY WORK WAS IMPORTANT. BECAUSE I WAS CHANGING THE LIVES OF THESE YOUTHS

41

IF YOU COULD, WOULD YOU CHANGE ANYTHING IN YOUR LIFE JOURNEY?

MS. FÉLIX DE SOUZA: No. l've

overcome many difficulties and a lot of humiliation, but every moment has been important to my growth. Obviously, at those specific moments I complained [I would ask myself] "why is this happening to me?". There was a very sad episode that I remember to this day. I was in the third grade of my primary education, around six years old. My father only bought shoes for us at the end of each year when he received his year-end bonus. And when the shoes wore through, around mid-way through the year, he would place cardboard inside them: when it rained. I would use a plastic bag to keep my feet dry. On one such rainy day during break, I was sat with my legs crossed. I didn't realise that a piece of the plastic bag was visible through the hole in my shoe. A boy came over and said: "Look, a plastic bag is growing out of the smelly, black tannery girl's shoe". All the kids came over and began kicking my feet. and this lasted about twenty minutes. Not one of the teachers nor headmaster came to help me. When I got home, I told my father what had happened and saw a tear fall from his eye... he then spoke to his boss to get an advance to buy me some new shoes. And the next day, his boss arrived with shoes for me and I went to school with new shoes. And then the kids said: "Look at the little black girl with new shoes".

WHAT LED YOU TO PERSIST IN THIS CAREER, DESPITE ALL THE OBSTACLES?

MS. FÉLIX DE SOUZA: From early on, I always wanted to study chemistry. I was born into the tanning industry and whenever tough situations arose, like exclusion, bias and racism, I always had my father to motivate me. He would say: "Study to make something of your life". And that was one of the things that motivated me most, because I grew up hearing this: "Study so that you can show these people you're a winner in life". This family structure is very important, and I see this through my students. I get the feeling that many youths leave home lacking motivation. [They say] "My father says I'll never amount to anything, that we were born poor and we'll die poor". That's enough to destroy anyone's life. Now, in my case, I had the chance and the luck to have wise parents.



And this year [2018], something really strange happened. I was invited to give a talk at an event called "Women of Brazil" in Franca, on the 26th of March, at a hotel. There were around 600 women taking part. I presented my talk and the next thing there was a line of people waiting to take a photo with me. I recognised five people in the line: three of them had joined in with kicking my feet at school.

I had few friends during my childhood, but I was friends with a middle-class girl, and she would always invite me to her house. One day, she invited me to a classmate's birthday party. It was in an apartment building, we went upstairs, and this classmate's mother answered the door. When she saw me, she said: "What are you doing here? Blacks aren't welcome in my home. You have to go. And use the service elevator". Imagine a child of eight hearing something like that. And that day [the day of the lecture in Franca], the two other people I recognised in the line to take photos with me were the daughter and mother who had refused to let me into the party. There is no way of knowing exactly how life will turn out.

DID THEY RECOGNISE YOU?

MS. FÉLIX DE SOUZA: No...

DO YOU THINK YOU'VE ALREADY REACHED THE HIGHEST POINT OF YOUR CAREER?

MS. FÉLIX DE SOUZA: No! There are still so many youths that need saving. I don't feel like I've done anything at all yet. Today I have the satisfaction of saying that, this year [2018], I have 20 students in the grant project. At the beginning of the year I had five scientific initiation grants. But back in March, when I won the "Make a Difference" award from O Globo newspaper, I walked onto the stage, spoke a little about the project and there was a business executive in the audience. who's actually from here in Rio de Janeiro. He asked for the school's telephone number. The following week he called asking if there were any more students in that situation. I said. "that's the most common situation we have here". So, he said: "I'm going to give you 15 scientific initiation grants and I will fund the project with these kids". That's why I now have 20 grants. My work is marching forward like many little ants. And I think we've only just begun.

> WHENEVER TOUGH SITUATIONS AROSE, LIKE EXCLUSION, BIAS AND RACISM, I ALWAYS HAD MY FATHER TOMOTIVATE ME. HE WOULD SAY: "STUDY TO MAKE SOMETHING OF YOUR LIFE"



THE CHALLENGES IN



Women from different fields of expertise revealed some of the difficulties they faced throughout their careers.

PROFESSIONAL CAREER PATHS

BY ÉRICA DE MELLO SILVA, JANAÍNA DUTRA, RENATA FONTANETTO AND VANESSA BRASIL PHOTOS: PROMOTIONAL ARCHIVE



WE NEED TO COMBAT STEREOTYPES AND SMALL DAILY AGGRESSIONS

"I think we face two major challenges: stereotypes and microaggressions. Fighting stereotypes is difficult when you've been subject to them since primary school, into high school and throughout university, hearing that there is no place for you. It may be expressed in a way that certain people may not consider aggressive, because they are already inserted in the context of stereotypes and as such, think it's silly, something superficial. But when you hear this stuff all the time, you start getting the feeling that you don't belong where you are, you get a feeling of isolation. Regarding microaggressions, it goes much along the same line. Some people don't suffer when it comes to those types of stereotypes and spend the whole time reminding you that you're in the wrong place. They think it's normal and that you shouldn't feel bad, because they're only stating the obvious."

Josephine Rua, astrophysicist and editor of the blog Cientistas Feministas

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MOTHERHOOD MUST BE CONSIDERED IN PUBLIC POLICIES

"There are countless challenges, chiefly the difficulties imposed in certain situations, for example, caring for the family and domestic chores. Generally speaking, women are more widely involved in this family context and this issue is very often misunderstood in the world of science. I think the issue of motherhood is still a huge challenge. Women's activities are interrupted during this period, and they often face difficulties continuing their academic lives later on. This is a vitally important issue that calls for keener observation. so that women are able to be integrated and attain their potential, which is at the same level as any man's."

Maria Alice Alves, ecologist and professor at the Rio de Janeiro State University (UERJ)

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GIRLS ARE NOT ENCOURAGED TO SEEK CAREERS IN STEM AREAS

"Women face several challenges in STEM (science, technology, engineering and maths) areas. Sometimes they deal with prejudice, sexism and discrimination. In fact, the challenges commence even before their studies, in the family, as girls are not encouraged to seek careers in STEM areas. In general, there are very few women in STEM areas, and even fewer in higher positions. There are many obstacles to climbing the career ladder, and part of this is due to interruptions like pregnancy and children, for example. It's worth insisting, because it's really worth working in science. It is something that provides personal satisfaction, it satisfies our intellectual curiosity. It's worthwhile taking on these challenges and trying to change this reality."

Irina Nasteva, particle physics researcher at the Federal University of Rio de Janeiro (UFRJ)

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RETHINK EDUCATIONAL SPACES AND KNOWLEDGE PRODUCTION

"It's already tough studying science in Brazil because few people have access to higher education, where scientific research is actually developed. In the specific case of women, there is a structural issue within society which keeps women tied to the home. Very often, having a child is an obstacle even to a woman that has a minimally stable scientific life. According to statistics, within courses linked to science and the production of knowledge, the number of women is generally lower than men. Firstly, we need to reconsider access to education. Then, we need specific policies so that women are able to access scientific spaces of knowledge production, remain in them and complete their work. It is important to persist and resist, because we cannot permit fields that are dominated by only a few people. Women need their own space for the production of knowledge, as well as socialising and communicating their work. This is also true for black and indigenous women, who should also have their own spaces for production, so that we have access to the highest possible number of discussions and knowledge to solve problems."

Leinimar Pires, philosopher and Brazilian literature and culture researcher

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WE NEED TO TRUST IN OUR OWN WORK

"As women, we face many difficulties in the field of exact sciences and engineering. Firstly, as there are fewer girls and women in these areas, there is the problem of not being able to join the group. Once this is overcome, other difficulties include being recognised as professionals and having our voices truly heard. There is still a very masculine culture in these areas – you are expected to be hyper competitive, which hones masculine attitudes that do not necessarily make science any better. We need to change the image that scientists have built up around themselves, and the image that society has of these professionals. I also think we need to deal with our own insecurities, our own fears, and remember that we are actually able to do everything that a male scientist can. History has shown us wonderful examples of women who have done incredible things, completely revolutionising their areas of study and the world, and that is why we must persist. It is vital that we not give up on our dreams, as they are what drive us to go further."

Priscilla de Sousa Silva, physicist and professor of aerospace engineering at São Paulo State University (UNESP)



DAILY PROBLEMS

"My main problems are all external, like racism, sexism and a lack of opportunity. I am a black woman and I need to remind myself of that every day, because sexism and racism don't allow me to forget it. I'm always on the defensive and it's exhausting. They call us crazy and ignore the fact that they do everything possible to drive us mad. But I continue to fight courageously, because I realise just how many had to die so that, today, I can occupy several spaces. And I need to continue moving forward, for those yet to come, for my child and all the children that need to find black women occupying spaces of prominence." **Maíra Azevedo (Tia Má)**, journalist, comedian, digital influencer and YouTuber

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AN UNPARALLELED FEELING

"The toughest part about a career in science is noting how many other women along the way have given up because they became mothers, or choose to no longer put up with the ridiculous put downs from their male counterparts. I gradually lost my feminine partners in the struggle which made me realise that, besides my work as a scientist, I also had the mission to guarantee that in the future, women would not give up on their careers due to these silly comments. And do you know why? Because this is a wonderful career. When you realise that you are the first person to understand something in the world, it is an unparalleled feeling. That is why I am a scientist. I chase that feeling every day – after loads of work, there is a moment of complete ecstasy. It's orgasmic!"

Márcia Barbosa, full professor at the Federal University of Rio Grande do Sul (UFRGS)

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WOMEN SCIENTISTS AROUND THE WORLD

BY HINGRID YARA AND REBECA BAYEH

There are myriad social and cultural contexts, but there are also many similarities in the inspiration and difficulties faced by women working in science around the world



Sue Nelson argues that women need models to follow



"If you can't see it, you can't be it", says British physicist and journalist Sue Nelson, when asked what led her, when still a girl, to delve into the world of science. In her mind, women need models to follow. "If you see a woman doing the work, you think 'I can do that, too!", she argues. Ms. Nelson is the author of Wally Funk's Race for Space (The Westbourne Press, 2018) about the pioneering life of North American aviator Mary Wallace "Wally" Funk. She is also an award-winning radio presenter and documentary producer. Nowadays, she produces promotional videos for the European Space Agency and presents the monthly podcast Space Boffins.

Nelson believes that science fiction may serve as a source of inspiration to girls, as women are often scientists in this world. A participant at WoW - Women of the World Festival staged last November in Rio de Janeiro, she reveals that one of her biggest inspirations as a child was the TV series Star Trek, wherein one of the main characters was a black woman.

"I was at university 30 years ago. It was very uncommon to find a woman studying physics. There were only three of us in the whole class", she says. Ms. Nelson recalls that she and her female colleagues often heard that they shouldn't be physicists, as they were occupying a masculine space, and that they should get married instead. She believes that, despite having a higher number of female role models in science, things are still much the same. "You need to focus on what you like and not on what people think you should be doing. That's how you win and achieve your goals. So that future generations can see that other women have blazed these trails before them", she advises.

DIFFERENT, BUT SIMILAR

The 2018 edition of the WoW – Women of the World Festival staged in Brazil and curated by the organiser of the international festival, Jude Kelly, and the director of the organisation Redes da Maré, Eliana Sousa Silva, featured the participation of dozens of Brazilian and foreign women scientists working around the world. The inspiration and challenges faced by women in the world of science formed the topic of debate in several activities, including round tables and tutoring sessions. In the mind of Bulgarian scientist Irina Nasteva, an event participant, sexism is somewhat veiled nowadays, though it is still present throughout society. and there are many similarities in the difficulties faced by women working with science around the world. Ms. Nasteva. who earned her doctorate in the United Kingdom and now develops research on particle physics and lectures at the Federal University of Rio de Janeiro (UFRJ), affirms that there are now more women working in the field which allows for the formation of support networks. "It takes time to change a culture and attitudes, it requires a change of generations, too. But I think we're on the right track", she declared.

Josephine Rua, also a physicist, agrees that there is sexism within the global academic environment, but highlights certain differences in relation to the way the subject is treated based on her experience as a researcher in Paris. "Here [in Brazil] we still face enormous difficulty when it comes to speaking about psychological and sexual harassment in universities and research institutions", she laments. She comments that in France, harassment is dealt with as a managerial issue within institutions. "There, you can rely on a trained team to work on and solve problems of psychological and sexual harassment within institutions".

The scientist took part in a workshop about women in science at the International Centre of Theoretical Physics in Italy in 2015, and recalls the difficulties faced collectively by women in different regions of the world. "You notice the differences compared to typical Latin American cases, the typical African cases, the typical cases of Muslim African nations", said Rua. Some career barriers are often imposed by the country of origin, as is the case of women whose nationality prevents them from entering the United States and certain countries in Europe, where the majority of international science conferences are staged. "There is a general problem, but it is aggravated by circumstances and by the type of minority you are part of", she explained.



To Timandra Harkness, men are more encouraged to take risks.

REPRESENTATIVIDADE

Biologist Ana Cláudia Gonçalves, who studied at different institutions throughout her academic formation, says that one notable difference among the countries she spent time in, is the discrepancy between the number of women and men in the teaching staff and in positions of leadership. She graduated from the Federal University of Paraíba (UFPB) with a sandwich internship at James Cook University in Australia, and has a master's degree in education through the University of Sheffield in England. She stated that, in the latter, there were far more women on the teaching staff, including in department leadership roles. During her graduate studies in Paraíba, there were only two women part of the department staff.

This difference in gender representativeness in academic circles seems unanimous among scientists that took part at the event, though individual perceptions on the causes and consequences of the phenomenon range widely. "Men are more likely to be socially compensated for taking risks", states British comedian, author and science journalist Timandra Harkness. "We are rewarded when we attain success. But you can only obtain success by taking risks", she added.

To Márcia Barbosa, physicist and professor at the Federal University of Rio Grande do Sul (UFRGS) and member of the Brazilian Academy of Science, "we pretend there are no problems here in Brazil, there is no recognition of the discrimination towards women in science [...] We can only raise the issue of bias in academia with numbers and facts", she criticised. "Another issue is that Brazilian universities have [only recently] begun to practice diversity. When I went to university, it was only open to the economic elite, so there was no problem." Having worked with gender issues in science for the past 20 years, the physicist hopes to shed more light on the problem to bring about specific regulations for women in academia and a change in the education process. Márcia's experience shows that the percentage of women entering graduate programmes in physics is low all over the world, and that a gender imbalance in the area worsens as careers evolve. In her opinion, this boils down to behavioural and cultural phenomena, which feed girls with the belief that their careers in science won't lead anywhere. "We need to work on this language that teaches our children that things associated with electronics and tools are only for men. [...] Female empowerment is on the rise, but the world answers back with: your place is over here in the corner. You can be a doctor, study biology, be concerned about the environment, but you won't design a computer, you won't make relevant discoveries. We need to break out of this corner", she says.

Similarly, Brazilian astronomer Duília de Mello, vice dean at the Catholic University of America in Washington DC, USA, encouraged women scientists during her talk about women in space science. "Don't worry if you're still not sure what your limits are [...]. This is not the time for timidity", she affirms Ms. de Mello argues that presenting a positive attitude, especially at a politically negative point in time for women and science, is an instrument of social transformation. 52 BRITISH WOMEN

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MOTHERHOOD IN THE SCALES

63



Women scientists defend motherhood as an important agenda in the debate about science and gender.

BY ALESSANDRA BRANDÃO, GABRIELA NESTAL DE MORAES AND ROSSANA SOLETTI ILLUSTRATION: ANDRESSA MEISSNER

o be or not to be a mother? As significant as Hamlet's dilemma, the core of which was the death of his father, the subject of motherhood for women scientists involves the decision to create new lives, which will be linked to the cultural climate of the mother's professional environment. More often than not, this environment insists on ignoring that quality scientific work, like any other human activity, requires a level of personal satisfaction – which may include the experience of motherhood. This ignorance may have its roots in the earliest days of modern science, the 16th century. Firstly, because an almost comprehensive masculine representation believed that scientific activity was unsuited to women, as men were geared towards productive labour, while women were relegated to reproductive labour. Secondly, because this activity was associated with the idea of genius men, that is, those who cultivated a personal life different to other members of society. To clarify this erroneous view of scientific work, one simply needs to turn to the same tool so valued in science: the numbers. According to the report "Gender in the Global Research Landscape" published in 2017 by Elsevier, 49 percent of the authors of Brazilian scientific publications from 2011 to 2015 were women, indicating an 11 percent rise in relation to the previously analysed period of 1996 to 2010. Despite representing half the productive force in national science, just 38 percent of Brazilian women scientists become leaders of research groups in their fields of expertise, exemplifying the challenges they face in rising up through the ranks in academia.



During the WoW – Women of the World Festival held in Rio de Janeiro in November 2018, productive women from several fields, including scientific research, we interviewed researchers about the topic of motherhood and science, in an effort to understand how they see this issue and conduct their careers, conciliating the myriad challenges of life as a scientist and caring for children.

One point seems unanimous among these researchers: all the interviewees agreed that the issue should be included in the policy agenda on gender, as it is something that has been neglected over time. What we notice is that, oftentimes, women exert excessive effort in continuing their academic productivity and caring for their children, without the necessary support, making it increasingly difficult to reach their full potential as women in science. As a result, we can provide at least three specific situations: i) women that give up motherhood in favour of their careers; ii) women that give up their careers due to motherhood; iii) those that manage to conciliate research and motherhood and will likely face many obstacles.

RESEARCHER MUMS: A SUPER POWER?

Zélia Ludwig, professor at the Federal University of Juiz de Fora (UFJF) and a specialist in experimental physics, became a mother in 2004. According to the researcher, when her daughter was born "there was very little discussion regarding the difficulties mothers face in academia". However, Ms. Ludwig carries the trump card of trailblazers: she was the first professor in her department to take her daughter to the laboratory and into the classroom, in an attempt to naturalise motherhood in academia.

Catarina Marcolin is an oceanographer and professor at the Federal University of Southern Bahia (UFSB). A representative of the new generation of researchers, she decided to have children only once she had been hired by a university. This has become a common strategy amongst women scientists. However, even considering this stability, there still lies the challenge of motherhood and productivity.

Karín Menendéz-Delmestre is a physicist, a specialist in galaxy transformation and professor at the Federal University of Rio de Janeiro (UFRJ). The Puerto Rican researcher recalls how the lack of attention paid to the issue of motherhood is even crueller in other nations she has visited. Mother of a two-year old girl and pregnant with her second, she jokingly says that she's already preparing for a second level in dropped production – even though she hasn't yet recovered from the first.

> LUDWIG CARRIES THE TRUMP CARD OF TRAILBLAZERS: SHE WAS THE FIRST PROFESSOR IN HER DEPARTMENT TO TAKE HER CHILD TO THE LABORATORY AND INTO THE CLASSROOM

Vera Maria Ferreira da Silva, the most experienced of the researchers interviewed, is a biologist specialised in marine mammals. She completed her doctorate in England with her daughters, around three decades ago, soon after the death of her husband. At the time, her kids were aged six and four. Despite the tough scenario, she says she gained valuable institutional support in the country, which allowed her to complete her studies.

IT'S NOT ABOUT WHINING

Scientist mums have reported treatment they consider unfair within the academic environment in several forums dedicated to the topic. Stages such as pregnancy and more intensive care of younger children are especially tough. Reports range from prejudice to being dropped from postgraduate programmes, allegedly due to low productivity.

Difficulties in conciliating motherhood and an academic career are approached by the research group Parents in Science, founded in 2017 by Rio Grande do Sulbased biologist Fernanda Staniscuaski. Formed by five researcher mums and a researcher dad, the group was created with the goal of discussing the reality faced by many teachers in Brazilian institutions.

The group is currently studying the impact caused by the initial years of motherhood on the scientific careers of Brazilian women. According to data collected thus far, the publication of scientific articles by women suffers a drop in the three years following the birth of their children. This fact is related to the period of maternity leave and the intensive care required by children in the earliest phases of life. However, postgraduate programmes and development agencies don't take this fact into account when calculating productivity indexes. THE PUBLICATION OF SCIENTIFIC ARTICLES BY WOMEN SUFFERS A DROP IN THE THREE YEARS FOLLOWING THE BIRTH OF THEIR CHILDREN

Another problem related to motherhood is managing to obtain funding for research. According to a 2018 study by researchers from the University of Bath, in the United Kingdom, conducted with 262 scientists, female academics with young children face greater difficulty in securing funding for their research and generating interest in their results than their male equivalents.

The experiences of our interviewees show that, despite being full of women, the academic environment continues to be governed by predominantly masculine values. Physicist Zélia Ludwig revealed that on one occasion, when called upon for an academic activity at the last minute, she needed to justify her refusal due to the fact that she needed to care for her still very young daughter. The supervisor at the time responded: "we all have our problems", attributing a negative value to the child. Despite having built a highly productive career, Zélia has never forgotten the degree of difficulty in splitting herself between São Paulo, where her young child stayed with her grandmother, and the classes she taught in the state interior of Minas Gerais. At one point, she opted out of a post-doctorate abroad, in order to accompany her husband who was also studying. "He simply couldn't study and look after our little girl", she jokes.

Oceanographer Catarina Marcolin recalls that at the time of her pregnancy, four other academic colleagues had children, three of whom were men. The impact on production, however, was only felt by the women. Following the birth of their children, the men continued working eight hours or more per day, maintaining – or even increasing – their academic productivity.

When analysing what happens nowadays with younger women, biologist Verda Ferreira says: 'I rarely see any pregnant students in my area". She alleges that, in general, the volume of field work and the lack of support lead to pregnancies being put off. "The last student that fell pregnant never came back after defending her doctorate thesis. It was a real shame, as she never published her work", she lamented. RAISING THIS TOPIC WITHIN THE AGENDA FOR PUBLIC DEBATE AND PROMOTING A CULTURAL CHANGE ARE THE MAIN WAYS TO FACE THIS ISSUE

POSSIBLE CONFRONTATIONS

Raising the topic of motherhood in science within the agenda for public debate and promoting a cultural change are the main ways to face this issue. Physicist Karín Menendéz-Delmestre mentions that policies geared towards researchers who become parents, without a cultural change in paternal care for children first coming about, would be a trump card for some men, who would then dedicate themselves to increasing their production. According to a 2016 study published by researchers in California, USA, those who most benefit from such policies are the male members of the teaching staff. The study, conducted with 1299 teachers from economics departments classified among the best 50 in the United States, was published by the German research organisation the Institute of Labour Economics.

According to Ms. Ludwig, from UFJF, culture only changes when women are aware of their place and are vocal about this. As such, one of her projects is aimed at empowering girls from socially and economically vulnerable communities in Juiz de Fora, in the state of Minas Gerais. In her mind, a woman's place is wherever she decides to be, and that includes science, with the right to fully realise her desires. Biologist Vera Ferreira argues that women need to stand together, support each other and ask one another for help. "Creating a support network among women is fundamental", she reiterates. However, she repeats that the creation of a support network among family and friends should not restrict the expansion of this discussion in the public sphere.

Science policies are marked as an important tool to correct some of these distortions. To oceanographer Catarina Marcolin, public calls that consider periods of maternity leave, like those of Instituto Serrapilheira and the L'Oréal- UNESCO- ABC Award from Women in Science, are examples of effective affirmative action in this direction. Another point highlighted by women researchers is the need for planning focused on conciliating motherhood and science that contemplates the implementation of spaces where children can be looked after during periods of study or work, such as institutional daycare centres.

To Márcia Barbosa, a physicist and professor at the Federal University of Rio Grande do Sul (UFRGS), having kids is not only a personal issue and should also be seen as a responsibility of the State. Active in the agenda of science and gender for manyyears, Ms. Barbosa echoes that unity among women bolsters and leverages public policies that cover this topic. If unity is what counts, then the 2018 edition of the WoW Festival shows that this front in the battle is already taking shape •





BY CATARINA MARCOLIN AND ZÉLIA MARIA DA COSTA LUDWIG PHOTOS: ZAIKA DOS SANTOS

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WOMEN IN SCIENCE



If the access of girls and women to scientific knowledge and academic careers is fraught with challenges, the difficulties faced by black women are even greater.

> ccording to the Brazilian Institute of Geography and Statistics, the proportion of education is 2.6 times higher than black women. Regarding the distribution of training and research grants, the participation of the black population decreases as the level of though more acutely for women. A survey published in 2015 by the CNPg - National Council for Scientific and Technological Development reveals that the number of black grant students is showing the result of racial and social inclusion policies, and lower at a doctorate level. Of the total invested in was allocated to women scientists - that year, black women accounted for only 7 percent of the total of 14040 grants.

To delve deeper into the subject, we interviewed several women fighting to occupy space in the arts, science and technology. Read more here:

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Gabi Monteiro is a resident of the Chapéu Mangueira slum in Leme, in the southern district of Rio de Janeiro. She has a degree in fashion design through the Pontifical Catholic University of Rio de Janeiro (PUC-RJ), and is a creative director, aesthetics activist, researcher and entrepreneur. Her workshop on 3D printing applied to the production of clothing and ancestry was a huge hit at the 2018 WoW – Women of the World Festival. The activity was promoted by Olabi/Pretlab which supports workshops aimed at the relationship between technology and the arts under myriad themes, such as natural cosmetics, online safety and computational thinking.

Ms. Monteiro, could you describe the 3D printing workshop?

Ms. Monteiro: It's a point of initial contact with technology, and also a moment to understand that 3D printing is not as far away as some people imagine. It's something very close, in fact, so it's a great idea to get more familiar with it. Technology facilitates so much. Institutions like Olabi/Pretlab help bring us closer to this technology, so that we can develop something new, generate new ways of thinking, providing a fresh outlook on product development, or to get an idea off the drawing board.

It's a really great project. I'd like you to tell us more about the relationship between black women and technology.

Ms. Monteiro: I think there are still very few black women involved with technology, because it often involves some very expensive equipment. But I've noticed that when black women gain access to this information, it makes a huge difference because it represents a new point of view. It's important to encourage plurality, regardless of the person's group, but when this person is a black woman, she notices specific issues, of greater interest to her, something she will pay more attention to.

We also spoke with **Daniela Sousa** Santos, who took part in the 3D printing workshop.

What do you think about using this technology to empower black women?

Ms. Monteiro: I find it fascinating. There are spaces and actions that we would never have thought possible to occupy. But we are occupying them, even if only barely. Seeing and experiencing this is simply amazing! When discussing underrepresentation of women, especially black women, there are different angles, including from the point of view of the human sciences. Enoe de Moraes, a psychologist and a collaborator with the Center for Afro-descendants and Indigenous Studies at the Federal University of Goiás (UFG), spoke of the difficulty in studying racial issues from a psychoanalysis standpoint. Ms. de Moraes: I believe that this trajectory of dedication to studies, of this struggle to commit to and produce science, is already a form of empowerment. Obviously it comes with a lot of scars, as we have always fought an uphill battle in university, fighting tooth and bone to attain our space. Acknowledging racism is still a huge problem within all fields, and it's no different in psychology and psychoanalysis. Unfortunately, it's a global problem and institutionally effects all areas, all fields.

IT'S IMPORTANT TO ENCOURAGE PLURALITY, REGARDLESS OF THE PERSON'S GROUP, BUT WHEN THIS PERSON IS A BLACK WOMAN, SHE NOTICES SPECIFIC ISSUES, OF GREATER INTEREST TO HER

Gabi Monteiro



> Scan the QR code and listen to the podcast

MS. FÉLIX DE SOUZA IS AN ARTIST WHEN IT COMES TO TRANSFORMING REALITIES. SHE TRANSFORMED HER OWN REALITY AND DID THE SAME FOR MANY OTHERS. AND WHAT ABOUT YOU? HAVE YOU DISCOVERED WHAT YOU? HAVE YOU DISCOVERED WHAT YOU CAN DO TO SHAPE THE REALITY THAT SURROUNDS US?

> Scan the QR code and listen to the podcast

Examples like **Joana D'Arc Félix de Souza**, a professor and researcher, are simply breathtaking. She has a degree in chemistry from the University of Campinas (Unicamp), studied at Harvard in the USA, and now collects awards for developing scientific initiation projects with youths in vulnerable situations – involved with drugs or prostitution, in Franca, in the state interior of São Paulo.

How can we change the reality of teachers so that they can become multipliers of what you've done?

Ms. Félix de Souza: Well, something I've noticed throughout my career, something rather unpleasant, are teachers with prejudice towards students due to their social, financial or religious status. Very often, the views of teachers need to be broken down and reconstructed in order to accept doing work like this, because not everybody is willing to work with people involved in prostitution and drug trafficking. I received a lot of criticism when I began this work at my school. But you have to believe.

AFROFUTURISM AT WOW

Afrofuturism at WoW is aimed at science communication publicised through a website with content in video, podcasts and photography, idealised and organised by Zaika dos Santos, a multi-artist and Afrofuturist researcher.

The initiative was produced as part of the workshop Women in Science, organised by the British Council in partnership with the Museum of Tomorrow. Ms. dos Santos took part with women from all over Brazil, joining in the capacity building sessions for science communication. She was tasked with recording moments related to the theme of science and technology at the 2018 edition of WoW - Women of the World Festival.

Her goal was to contextualise the concept and form of Afrofuturism connecting the past, present and future through African and Afro-descendant art, science, technology and innovation through the perspective of black women. Afrofuturism is a blend of African ancestry and current technology, along with the creation of a narrative that places black people in prominent roles. The movement gained emphasis in the North American context in different genres: musical, through musician and composer Sun Ra; literary, with Octavia E. Butler, a sci-fi author, and Mark Dery, author of the essay entitled Black to the Future; and in film, with the blockbuster *Black Panther*.

According to Ms. dos Santos, "doubts have arisen regarding what's fiction and what's reality when it comes to Afrofuturism". In her academic research, Ms. dos Santos strives to show the potential of these concepts of black history within a practical and real scope which, according to the author, was made invisible through the slavery/colonial period. To do so, she spends her time bowed over history museum archives like those at the Afrobrasil Museum (SP), the Museum of Arts and Crafts (MG) and the Museum of Mines and Metal (MG), as well as the works by black scientists and researchers, including Carlos Machado, author of the book Geniuses of Humanity: Science, Technology and African and Afro- descendant Innovation.



photographic and audio-visual records, the author created sculptures and a contemporary aesthetic concept using imagery, inviting participants to pose with pieces. Conversations and images originated from instigating questions:

What do we know about African and Afro-descendant art, science, technology and innovation?

What does Afrofuturism mean to you? •

"Could Wakanda [the fictitious nation in the film *Black Panther*] actually exist?", asks Ms. dos Santos. To answer this question, she introduces reflections in her academic research: "Speaking directly with African historians and curators, I discovered the word Wakanda is from the Kongo language, widely spoken in parts of Central and Southern Africa, especially in countries from the great lakes region. It belongs to the Kongo ethnolinguistic group and, as such, is part of the Bantu linguistic family, derived from the Niger-Congo language family. Wakanda, in Kongo, means 'what is ours by right'", she explains.

Besides a topic in her research, investigating the fictionalisation of the concept of Afrofuturism and other historic forms of silencing black people was the driving force behind her work during the festival. She spoke with 20 black women and a man – including researchers, scientists, artists, producers and organisation leaders – working in diverse areas of the event under the banner of Afrofuturism - Art, Science and Technology. For the



Visit the website to find out more about the project:



https://zaikadosantos7.wixsite.com/ afrofuturismowow

A PLACE AMONGST THE STARS

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ILLUSTRATION: ANDRESSA MEISSNER BY VANESSA BRASIL

64 BRITISH WOMEN IN SCIENCE

...recognition > interview 65

Astronomer and astrophysicist Duília Fernandes de Mello is one of Brazil's most recognised scientist in the world

ver her 25-year-long career, she has published almost 100 scientific articles, as well as the book "Living with the Stars" (Panda Books, 2009), wherein she narrates a little of her biography. Among her leading discoveries is the supernova SN1997D and the so-called "blue blobs" – a group of stars outside of galaxies –, the latter considered by Ms. Fernandes de Mello to be her most important recent work. The relevance of her production and the importance of her scientific research in Brazil have been acknowledged in recent years - she was nominated one of the ten women changing Brazil by Barnard College at Columbia University, in the United States of America in 2013; and was elected one of the 100 most influential people in Brazil in 2014 by Época magazine. She is currently vice provost at the Catholic University of America in Washington DC, USA, and has enjoyed a long-standing partnership with the National Aeronautics and Space Administration (NASA), having participated in projects involving the Hubble satellite.



WHAT HAS BEEN THE HIGH POINT OF YOUR CAREER?

MS. FERNANDES DE MELLO: l've been working in science for 25 years, and there have been several crucial moments in the development of my career. I particularly enjoyed one subject called the "blue blob" [star clusters colliding outside of galaxies and found some 12 million light-years from Earth, first detected in 2008]. The discovery we made followed the scientific method of what we learned at school - you pose an initial question, develop a theory, conduct experiments and publish your results and your conclusions. Sometimes you are surprised and overwhelmed by the results, which will be passed on to new generations of scientists. I think that is the most amazing projects I've been involved in. It began in 2008 and continues until today, with many articles published thus far. I think that this is the highest point of my career.

WHAT HAS THIS PROJECT CHANGED IN YOUR LIFE?

MS. FERNANDES DE MELLO: When there is a project that you suspect may be important, that is going to provide results, you have to insist. Like getting funding, for example. I tried a few times, until one day NASA gave me US\$ 250,000. It took time and it was hard work, but, in the end, when I got the letter saying the project had been approved, it was acknowledgment that it was important and had been worth investing my time in. The impact on my career was enormous. It was also at that point that I left NASA for a while and went to university to work with the students, to pass on the knowledge and develop the project.

WHAT KIND OF CHALLENGES HAVE YOU FACED IN YOUR CAREER?

MS. FERNANDES DE MELLO: At certain points throughout our careers we reflect on why we are doing what we are doing. We get so hung up on the details of the project that sometimes we forget the beauty of science, of astronomy, of the universe. I've been through a few moments like that and I'm sure that's true for most scientists. It's something I've been discussing a lot recently. One day the passion runs out, and if what you feel for that doesn't transform into love, there's no point in continuing. But if you realise that it really is love, it's worth continuing investing in it. Love for one's career, just like any other type of love, also has to be cultivated. Sometimes is feels like the grass is greener on the other side, but that's not true; careers are difficult for everyone and it's all about perseverance. If you get to a point where you're thinking about quitting, you need to weigh up the pros and cons to decide if that really is the path. You can give something up now in order to achieve something else later. And that's what happened with me, at a certain point I gave up astronomy and came back to it later on. I came back better and stronger to do exactly what I wanted. You need to go through a type of catharsis.

THIS MOMENT YOU MENTIONED, ABOUT GIVING UP, WAS THAT THE MOST CHALLENGING PART OF YOUR CAREER?

MS. FERNANDES DE MELLO: It certainly was, yes. I was doing my doctorate at the time and a gave up. I submitted a letter to CAPES (Brazilian Federal Agency for Support and Evaluation of Graduate Education) saying: "I no longer want to be part of this grant. Enough." I was in the United States. But I later returned, and it was so much better! Because I understood why I had given up, I hadn't been doing what I wanted. Whatever the case, I felt completely overwhelmed. The thing is, you need to sweep up all the pieces and put them back together. And that's what I did. There were challenging moments in my career, too, because there is always someone looking to drag you down. But it's important to remember that it doesn't only happen to us, it happens to men, too. My husband is a scientist, so I know. Sometimes I talk to him about what I'm going through and he says: "Duília, that happens to men, too". The difference is that they don't verbalise or show it. It's all about sweeping up the pieces, it's important to have friends, to have some kind of mentor. I had that. At that time, it was a German that helped me, who gave me the opportunity and who helped me resurrect my career again. Sometimes, help comes from the most unexpected places.

SOMETIMES IT FEELS LIKE THE GRASS IS GREENER ON THE OTHER SIDE, BUT THAT'S NOT TRUE; CAREERS ARE DIFFICULT FOR EVERYONE AND IT'S ALL ABOUT PERSEVERANCE

WOULD YOU CHANGE ANYTHING IN YOUR CAREER? MS. FERNANDES DE MELLO: No.

I think it was necessary for me to pass through all these stages in my career to become who I am, so it would be difficult to exclude a part. It's like a scar, which is already a part of your body and which is also part of your growth.

WHEN YOU LOOK BACK ON YOUR TRAJECTORY, DO YOU EVER THINK "I'M EXACTLY WHERE I WANT TO BE", OR IS THERE STILL SOMETHING MISSING? MS. FERNANDES DE MELLO: Our

careers pass through stages. First, you're an assistant professor, then a full professor... When I became a full professor, I thought: "what now?". That was when [Donald] Trump was elected president of the United States and I decided that I would get involved with the leadership in education in the country. I am now vice dean at the university, and I'd like to be dean, or president, everything I can become in the North American educational system. Or the global educational system. I'm now in a position of academic leadership, but I've changed a lot.

WHAT MESSAGE WOULD YOU LIKE TO LEAVE FOR YOUNG BRAZILIAN SCIENTISTS?

MS. FERNANDES DE MELLO: This is a very difficult time for Brazil, and the rest of the world, too. But I think we need to rekindle our passion and invest in it, and then be sure that it will blossom into love. We cannot allow negativity to hamstring our focus, we need to push forward, slowly but surely. Things will get better. We need to invest now, because a better phase is on the horizon.





WOMEN WE WOULD LIKE TO HAVE HERE

BY ALICE MARTINS MORAES, BÁRBARA PAES AND RAFAELA LOPES FALASCHI ILLUSTRATION: ANDRESSA MEISSNER

A festival, celebrating women around the world, bringing together thousands of stories, desires and dreams – this was the atmosphere of the **2018 WoW** – **Women of the World Festival**

> e chatted to some of the women present and asked them all the same question: who would they like to have seen there, at that festival, on that occasion? The following statements mention some of the women that participated at the event, others that came to mind and those whose absence was felt.

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Lélia Gonzalez. She was a celebrated black Brazilian intellectual who produced a lot of important work, even questioning the concept of white, European, male science. She had the courage to face this epistemological mentality in academia and leveraged the thinking of very powerful black women. She would certainly have been thrilled to see something like this, something she helped to create, especially for the generation of black women that came later.

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For me, it would be **Luiza**, the skull fragment, from the oldest Latin American women ever found. Especially because, within science, we need to demystify this idea of objectification and begin to think about women, people, the genders, everything, within a context of action, and not merely observing and studying something. Today, Luiza has this status of being the oldest human fossil found in Latin America, she has been studied in depth, and she's had a tough year. I think it's about time she stopped being an object of study and became the master of her history.



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For the Brazilian public, **Diva** Guimarães, a woman who stood up last year and spoke of her history. She's a 70-year old activist and against all expectations, she managed to study, become a teacher and then suddenly before an elite audience of Brazilian and international literature, she stood up and became a symbol of FLIP (The Paraty International Literary Festival) last year. She is a wonderful and amazing woman who showed so much courage. She came to speak and be heard. Joana Gorjão Henriques

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I would dedicate this moment to **my mother**, who is 96 years old, and who paved my entire path forward. I would also dedicate this moment to two black intellectuals who have left us, but who both had a huge impact on my education: Lélia Gonzalez and Beatriz Nascimento. Conceição Evaristo

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A woman I would love to have here is **Marielle** Franco, in protest to all this violence. She should have been here with us. But she's not, so she lives on through all of us. So, I guess, in a way, Marielle is here with us at the festival. **Ana Paula Xongani**

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A woman I would invoke, someone I'd love to have here, and who I'm sure would love to be here, is **Chimamanda** [Ngozi Adichie]. She is who most inspires me right now. **Angélica Ferrarez**

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I would like to have invited **Emmy** Noether. Amalie Emmy Noether, a German Jew who developed Noether's theorem - celebrating its 100th anniversary - during World War I. She worked for no pay and was later expelled, and she did everything possible to produce her theory. She insisted, found a job, insisted some more and finally found her place. When she went to the United States, she was unemployed and finally managed to get a job at a good university. We need many more Emmy Noethers here. Women that insist, continue and fight. She had her 'he for she' in David Hilbert, one of the professors at the time who strongly advocated for her work. And she also had a 'she for she', several women professors that managed to bring her from a poor college to Princeton in the United States. We need unity among women, between the men and women who stayed on, we need the spirit of

Emmy Noether. Márcia Barbosa

Lélia Gonzalez. I think she was a pioneer in studying black women here in Brazil. She is a reference to many women here today. She opened a lot of doors, she spoke a different language, coined things that had never been coined before, from within academia. And I think that, today, if she were here, she would certainly be one of the very important names. Her presence would be enriching for us all.
22

I would bring my daughter, Isabela, who inspires me in everything, who gives me a hand with technology for empowering girls. Zélia Ludwig

22

I'll mention three people who are important. Firstly, Marielle [Franco], who should have been here. The choice of Rio de Janeiro to host the event was fantastic, the city is really grateful. So, I think it's very fitting for obvious reasons, the question of the failure of solving Marielle's murder. She would certainly have been very pleased and flattered, because Maré is involved, so she couldn't have been left out. The second person I really like is Ivone Lara. She was ahead of her time and played a really important role in Samba. I even have a quick story to tell. On the day Ivone died, I went to the morning mass at the São Jorge church. as always. The priest greeted me and then continued: "Before beginning mass, I'd like to pay tribute to a very special person, who has recently left us", and he began to sing: "sonho meu, sonho meu...". Imagine, in a Catholic church! That was amazing, everyone singing softly. The third person is my niece, Ludmila Almeida. She studied sociology, teaches African dancing, is a master in capoeira, and does a lot of work involving the culture.

Maria José Lopes Lima (Zezé)

22

I wish my grandmother were

here so she could see how important her strength, experiences and struggle as a woman are, how relevant and inspiring. **Annie Oliveira**

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It would be wonderful if Clátia Vieira were here. She is a coordinator for the State Forum for Black Women. I also think it is important for those women, housewives, to be here, too. It would be great for women that perform the more basic services to be here, because I feel these spaces need to be even more inclusive. Unfortunately, we always end up getting the same people, the same faces at events like this, even though it's an international affair. Cláudia Vitalino

I would invite all my neighbours from the Chapéu Mangueira slum. It's something I've been thinking about, in fact. It's a good question, because I'm from the slums and very often, even though I'm from there, much of what I do, like working with 3D printing, never ends up reaching the people from my area. I would love to reach these women, and the men, too. At this time of political turbulence, how can we reach men through an exchange? Today I brought the name of a woman, called **Dona Santa**. She was a leader of Maracatu Elefante. She is a strong black woman that no one has heard about. 🔪 Gabi Monteiro

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I always think of black women, the women who are part of my life. A woman that, unfortunately, is no longer with us today, but someone who I truly wish was here, would be my grandmother, Maria do Carmo. I think she would have a lot to contribute due to her trajectory, her life experience, her daily writing, too, using the concept by author **Conceição Evaristo**. I feel that this strength, this power inherent to women, to all the incredible women here, from so many different fields, would also have been a huge influence on her life. And because I couldn't bring my grandmother, who is no longer with us, I brought by mother, her daughter. I'm certain that [the event] will provide her with other experiences of the world. My mother is called **Elizabete**.

Stephane Marçal



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I would bring Joan of Arc, from the past, if I could. I admire her work, because she said that there is nothing impossible for a woman. And it just so happens that we share the same name. My father said he had heard the name on television, wrote it down and kept it in his wallet. He really loved that name. And I really admire it! If I could bring her back here today, I would show people just how strong she was, which has been portrayed in films and in books. Her strength is something that I think should be passed on to the women of today. Joana D'Arc Félix de Souza



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references



Emotional references



Social references





LOGBOOK

ILLUSTRATION: ANDRESSA MEISSNER

The challenges, inspiration and career paths of women in the world of science permeate all the content in this magazine.

he texts reveal discussions that took place during the 2018 WoW - Women of the World Festival, captured and registered by the attentive eyes and bubbling minds of 15 women that took part in the science communication workshop organised by the British Council in partnership with the Museum of Tomorrow during the days before the festival. The event went far beyond capacity building in science communication and triggered questions and reflections in these women that will follow them throughout their careers. Here's hoping that the statements below also provoke a change in you.

ALESSANDRA BRANDÃO

My academic career and my activity as a university professor have contributed immensely to my formation as a science journalist. However, I moved on from daily [journalistic] production, as I am currently involved in a physics department and work on subjects closer to the lines of research of my colleagues, like teaching science. Some years ago, though, I began feeling the need to adjust my coordinates and get back to my roots – science communication. [...] When I found out about the British Council notice [for training in science communication], my heart skipped a beat in joy at the possibility of being able to do something so interesting. I was extremely enthusiastic when I got word of my being selected. [...] The challenge was set! [...] I'm grateful for sharing... long live women in science!

ALICE MARTINS MORAIS

The internet has shortened distances, but even so, we from the North of Brazil still feel an acute inequality when it comes to opportunities. Taking part in the training [in science communication] and in an international festival is a truly innovative and transforming experience that I, a journalist from the

Amazon region, will carry with me for life. I have met women that I thought I'd only ever see in books or on the news, and many others I would never have met. Scientists, activists, incredible minds that taught me so much and also encouraged me to question. There is no doubt, I sensed the discomfort that was proposed on the first day of capacity building. Discomfort with the world, reflected in a desire to encourage change, even in these turbulent times; discomfort in terms of myself in having to complete my postgraduate degree and push further; discomfort in not accepting the status quo and discovering more places, more people and creating new projects.

BÁRBARA PAES

To me, the workshops with the children, discussing gender and stereotypes, were truly anthropological experiences. One of the children, a 10-year old girl called Ana, really touched me, because I felt like doing so much more for her. I asked myself what was within my reach. And I understood that the event [WoW Festival], created by women, for women, speaking about women, was a step forward in building networks so we can do more, for all the Anas out there. Empowering, teaching and promoting these meetings will certainly bear fruit, which we hope reaches as many girls as possible.

CATARINA MARCOLIN

Very wisely, the incredible Samia Abreu, a cordel literature writer of only 8 years old, alerted us at the opening ceremony: "with low self-esteem, all logic in life is lost". Besides filling our hearts with hope, she showed us that this new generation is powerful. But we cannot leave for future generations what we can do now. At the end of the day, it's "the actions of today that produce our tomorrow", as we are reminded at every turn by this beautiful museum that welcomed us over these few days.

ÉRICA DE MELLO SILVA

The opportunities created through science communication can foster numerous personal and institutional benefits. I work in the state interior of Brazil, and I know just how important partnerships with institutions like the British Council are in leveraging capacities and leadership. When dealing with the subject of women in science, this is certainly an urgent agenda. [...] The interaction with other participants was very enriching. Each of them introduced a little of their personal world, their beliefs and motivations for communicating science. It's clear that our common objective is to empower women and augment opportunities for women and girls in society, especially within science - and feeling this synergy in the discussions was wonderful. I'm very happy to be part of this unique network. I think that occasional generation and cultural shocks are always opportunities for learning. Watch Samia Abreu recite the cordel literature piece "Lei Maria da Penha" at the **2018 WoW - Women of the**

World Festival



GABRIELA NESTAL DE MORAES

Covering this event [WoW Festival], from a journalistic point of view, has been one of my biggest challenges. [...] It seemed so easy to write a manuscript on oncology and resistance to chemotherapy. Permitting this strategic estrangement within such a personal and close subject, namely "motherhood and science", almost led me to declare a conflict of interests. But I had the company of two wonderful mothers and scientists in covering this highly relevant issue and in developing the best way to approach the subject and generate the material.

HINGRID YARA

The event as a whole was intense and very touching. It was so much more than what I had expected. The seeds of restlessness were planted. We need to shirk inertia to attain movement, and we have taken the first step. I'm leaving this experience with a sense of discomfort and a desire for change, but also with warmth in my heart for having found myself in other women, for reconnecting with myself and the world. I'm leaving energised to keep pushing forward, whether along familiar paths or new adventures.

JANAÍNA DUTRA

At the [WoW] Festival. I found an environment that fosters exchange and sharing that was incredibly rich and far greater than any agenda. The reality surpassed my expectations. The exchanges with the female stars of the programme and especially with the colleagues from the [science communication training] group. [...] I'm taking the power of action away with me, even when it's local, and I'm already thinking about how I can contribute in the field of science considering my area of activity. I intend to carry this spirit and the power of working in networks, especially amongst women, with me for the rest of my life.

RAFAELA LOPES FALASCHI

I fell apart and built myself back up with the stories and experiences here, with all the reflections and questions posed by others. I'm no longer the same person. [...] I realised that when we become aware of the surrounding problems and discuss certain subjects, very often, certain "details" begin to flash before our eyes. [...] I'm leaving this opportunity thinking about turning ideas into reality. About improving approaches. About leveraging networks. [...] I hope for more WoW moments in Brazil from here on in, working towards something common amongst us and strengthening us. [...] We have to sow the seeds of ideas and actions. And care for these blossoming girls here who simply need a positive reference. And I met at least twenty of those referential women there.

REBECA BAYEH

I felt the pain of being a 'third culture kid', the daughter of Lebanese parents, born in Brazil, of battling with persisting identity issues. Having the opportunity to meet such diverse women with so much to teach was truly transformative, because it showed me a world of differences, similarities, identities, all admirable and inspiring, and helped me to consolidate everything I am in my complexity and intensity. [...] I'm heading home with the peace of mind that comes with knowing that I'm contributing to the world in a way that inspires and motivates me, and with the certainty that I am not alone in the daily battle, which is sometimes subtle and at other times right in your face, always painful and gratifying, to transform this world into a place that is also ours.

RENATA FONTANETTO

As a journalist and list enthusiast, I decided to write about the six moments that taught me a lesson with all my colleagues in the science communication training and the other participants at the WoW - Women of the World Festival. The lessons aren't new, but every now and then life insists on reminding us:

 A place to speak – we must allow voices to be heard; better than any other resource, the voice tells everyone where we are from, what we know and what we think.
A place to listen – as important as speaking is knowing when to be silent and listen. We need to listen to those who think like us and those who think differently.
Write and ask yourself: why do I communicate science, do journalism and defend gender equality?
If society is sexist and racist, science will reflect this.
Question, doubt, dare to be the annoying person that prevents unfairness from perpetuating.
There are many battles, you won't manage them all. One step at a time, forever forward and in a network.

ROSSANA SOLETTI

We are constantly judged for our choices, just because we're women - and, when you become a mother, the judgment doubles. Coming to this festival and getting the chance to speak to so many women scientists about the challenges of combining motherhood and a career is really amazing. [...] The [WoW - Women of the World] Festival opened my mind in so many ways. I felt a little ignorant at times, for not knowing anything about the subjects being discussed, and never even imagined the types of conditions that so many women are brutally exposed to. [...] I now have more women to admire, new friends and, hopefully, future project partners. I bet many of these empowered women will leave here with the personal mission and need to fight for their causes and spread this message throughout society. I certainly will.



VANESSA BRASIL

As a journalist and science communicator, I always hear stories about the difficulties in getting in touch with scientists in this process of "translating" information. This process between journalists and scientists in the Women in Science programme was different. It was a collective effort, in which all parties were heard and there were concessions on both sides. Perhaps the fact that we are all women and have a collective proposal in favour of science has contributed to this drive for mutual understanding and joint work.

ZAIKA DOS SANTOS

When thinking of everything that has been erased from the scientific history of people originally from Africa and Afro-descendants, I understand what my mission as a communicator/researcher/multi-artist/scientist really is. Despite it being a really complex mission, I'm not backing down from it. [...] Complex, sincere, simple, direct and showcasing all hegemony of erasure described in science, that's how I kept up with the content in learning about science communication. Speaking about my place to speak, localising my identity and representativenessin speech, I met many wonderful women, we exchanged a lot and I noticed that the content I discussed wasn't familiar to many of them – but even so, I keep on sharing.

ZÉLIA MARIA DA COSTA LUDWIG

This event was a milestone in the formation of new competencies [in science communication] and in consolidating old collaborative networks and promoting women scientists. This network will support women by sharing ideas, technologies, achievements that involve issues like gender, race and motherhood. It's wonderful that everything was done together, bringing together women with differences in their essence, backgrounds, problems and everything else part of the female universe.



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