



Editorial To The Eleventh Issue

Dear Readers,

Welcome to the 11th edition of the International Mathematical Union Committee for Women in Mathematics newsletter.

This edition features an exclusive interview with Selma Negzaoui from Tunisia, highlighting her inspiring journey and advocacy for women in STEM.

In the News from CWM section, we share the outcomes of the annual CWM Call. This year, 10 projects taking place in Brazil, Burundi, India, Malawi, Mexico, Namibia, New Zealand, Senegal, Uganda have been selected. We continue the section with a partial report on the successful May 12 2024 Campaign celebrating Women in Mathematics. This section also includes important updates and announcements about our members and ambassadors, reflecting our dynamic and committed network. Our Other News and Announcements section covers prestigious awards such as the AWM-SIAM Sonia Kovalevsky Lecturer, the Crafoord Prize, and the Maryam Mirzakhani Prize.

Finally, we are also proud to feature an insightful article by Andrea Vera-Gajardo et al. titled "Rare bugs: Gender and subjectivities in the field of mathematical research in Chile," which explores the intersection of gender and mathematics in a unique cultural context.

This issue of the CWM Newsletter is packed with inspiring stories and critical updates, underscoring our ongoing commitment to promoting excellence and inclusivity in mathematics.

Thank you for being part of our community.

Ekin Özman

Interview with Selma Negzaoui



We continue our interview series featuring CWM members and delighted to present Selma Negzaoui from Monastir University. Dr. Selma is an Associate Professor with Habilitation of Mathematics at Monastir University in Tunisia. She has been teaching mathematics for 19 years at Monastir, Gabes and Tunis-Elmanar Universities. She earned her PhD in Mathematics in 2013 from the Faculty of Sciences of Tunis, Tunis-Elmanar University. In addition to her academic and teaching roles, Dr. Selma has been a prominent advocate for women in mathematics, serving as the President of the Tunisian Women Mathematicians' Association since 2018 and as a Board Member of the African Women in Mathematics Association since 2020. Her dedication to both education and gender equality in STEM fields underscores her commitment to advancing mathematics in Tunisia and across Africa.

Q: Could you tell us how you got into math? What made you a mathematician? When did you decide to become a mathematician?

SN: As a child, even before starting primary school, when asked about my desired profession, my only response was "a teacher." During my primary school years, I stumbled upon math rules and theorems like the rule of three or Thalès Theorem. I was captivated by its profound applications in real life. This discovery ignited my passion for mathematics. It was in that period that I made a firm decision to become a mathematician.

Q: As a child or teenager, did you do math activities outside of school? Was there a pivotal moment when you knew you wanted to become a mathematician? Did you have any role models? (male or female?)

SN: It was my dream to become a teacher. Both male and female teachers have always been my role models; when I saw them in class, I envisioned my future.

I didn't have the opportunity to do mathematics outside of school. Holidays were used to read books, learn manual skills like cooking and embroidery, and engage in social activities. I'm not sure if there were any mathematical activities outside of school at that time, but now I know that private training is available for secondary school students in mathematics clubs.



Work meeting with Phd students

Q:Can you tell us about your research? What attracted you to this area of mathematics? How would you describe your main research problems to a non-specialist?

SN: As a student, I was fascinated by geometry and algebra, and I wanted to delve into numerical analysis and algorithms. However, what was available to me was the field of Harmonic analysis, which is a well-developed branch of mathematics in Tunisia.

I perceive Harmonic analysis, or Fourier analysis, as a crossroad between various branches of mathematics, spanning from representation theory to special functions, orthogonal polynomials, functional spaces, PDE resolution, wavelets, and operators theory. My research involves considering a type of Fourier transform that incorporates special functions as kernels, constructed by introducing a novel geometry. In my research, I aim to provide tools that facilitate the functioning of this machinery. One of the most significant results I have obtained is the discovery of a new formula involving the mixed product of Bessel functions using innovative techniques. This discovery enables the establishment of a convolution structure that opens the door to numerous new studies.

What is also attractive about this area is its wide range of applications in signals, communication, ultrasonography, image processing, music, and more.

Q: Can you tell us about your teaching and other aspects of your career as a mathematician? What are the aspects you enjoy the most? Do you have Ph.D. students? How do you view the experience of being an advisor?

SN: Teaching is a vital aspect of my career as a mathematician, and I find immense joy in imparting my passion for mathematics to students at different levels: undergraduate engineering students, bachelor's students, and master's students. Alongside teaching, I actively engage in research and mentorship. I have supervised master's students and participated in co-supervision for doctoral dissertations. Currently, I advise three Ph.D. students. As an advisor, I prioritize instilling values such as dedication to good work, scientific honesty, and ethics in my students.



Q: Have you faced any challenges as a woman in mathematics? If yes, did you have other kinds of support through these challenges?

SN: Mostly, the overall situation has enabled me to advance in my mathematics studies. During my studies, I received constant encouragement from my surroundings and the system; every year.

“ Celebrate every step forward, no matter how small, and don't wait for recognition to feel proud of your accomplishments. ”

One notable source of support came in the form of a grant from ENS de Tunis, which facilitated my academic pursuits and culminated in obtaining my diploma. Another boost is receiving the prestigious award for young researchers from the Tunisian Academy of Sciences, Humanities,

and Arts "Beit Elhikma" in 2021.

However, this does not prevent some incidents. One of which stands out from my past. At the age of 15, I had an incident with my math teacher who suggested that girls tend to excel in mathematics at a younger age but then lag behind boys in high school

and university. Whenever I face difficulties, I recall his words, questioning their validity and finding motivation to prove them wrong.

Another challenging issue was with my working space. I found it difficult to stay informed, as discussions often take place outside the university, in venues predominantly frequented by men, mainly cafes. Nevertheless, I have received support from a few other female colleagues who have more advanced careers than mine and have shown me the way forward. It is this motivation that drives me to be part of associations for female mathematicians, to provide support to young mathematicians.

Q: Did you have any advance notions or concerns about how your family's growth would intersect with your career growth? How do you balance work and family life?

SN: Like many Tunisian families, mine prioritizes education as a cornerstone of societal advancement. Upon



Young researchers Prize from the Tunisian Academy of Sciences, Humanities, and Arts "Beit Elhikma" in 2021.

completing my "Maitrise" with distinction, topping the dean's list, and earning numerous opportunities for grants and PhD studies abroad, discussions with my family, particularly my mother, revealed differing perspectives. While she valued my academic achievements, she expressed concerns about my plans to travel for further studies before marriage and starting a family. Her apprehensions stemmed from a desire for my success not only in my career but also in my social life. Despite challenges, I've pursued my academic and professional

goals while respecting my family's concerns. I still remember when I was defending my Ph.D. thesis, my three-month-old son was crying. It was a moment that epitomized the intricate dance between my scholarly ambitions and maternal duties. Balancing work and family life has been especially challenging since welcoming my two babies into the world. I recall the difficulty of trying to focus on research while

caring for them. Often, I would wait until they were sleeping to begin working, but even then, I struggled to muster the energy to accomplish much.

However, the situation improved when my children entered kindergarten. With the support of a structured childcare environment, I found greater flexibility to focus on my academic pursuits while ensuring my children received the care and attention they needed. Today, my 10- and 11-year-old sons still require care, so I've learned to cherish the time. I prioritize online collaborations and prefer short stays over longer ones. If necessary, I cover the cost of childcare.

Q: In addition to being a CWM member, you have been actively involved in various associations for women in mathematics, such as the African Women in Mathematics Association (AWMA) and the Tunisian Women Mathematician Association (TWMA). Could you please tell us more about these associations?

SN: Currently, I serve as the President of the Tunisian Women Mathematicians Association (TWMA) and am also a member of the African Women in Mathematics Association (AWMA). Both associations are dedicated to promoting the achievements and empowerment of women mathematicians through various initiatives and events. AWMA provides a communication network for African mathematicians, facilitating the transfer of information about opportunities to all. AWMA regularly organizes webinars in addition to hosting regional mathematical events in Africa.

Each year, TWMA organizes at least four key events. The first event is the TWMA Prize Ceremony, an annual occasion where TWMA awards prizes to recognize outstanding achievements by Tunisian women mathematicians, particularly for the best Ph.D. theses in mathematics and applied mathematics.

Secondly, we celebrate the International Day of Women and Girls in Science on February 11th. This typically involves meetings and exchanges between TWMA and other organizations of women in science. We organize conferences and roundtable discussions on current issues.

Thirdly, TWMA participates in the May 12 initiative by organizing events to celebrate the achievements of women in mathematics, promote gender equality in the field, and foster networking opportunities among Tunisian women mathematicians.

Fourthly, we hold an annual event marking the beginning of the academic year, which includes TWMA's general assembly meeting to discuss plans and initiatives for the upcoming year.

Furthermore, TWMA collaborates with any initiative that aligns with its objectives, furthering its mission to empower women in mathematics.

As the President of TWMA, I take the lead in strategizing and coordinating each event, with the aim of engaging passionate members in the planning process.



May 12. 2023. TWMA event

My involvement in associations has been transformative on a personal level. As a shy individual, I have pushed myself to step out of my comfort zone, making connections with mathematicians from diverse backgrounds and seeking funding opportunities. This has allowed me to contribute to meaningful initiatives, such as the International School on Dynamical Systems and Applications 2019, and make a positive impact on the mathematics community in Tunisia. Through TWMA, I am committed to advancing the cause of women in mathematics and fostering an inclusive and supportive environment for all mathematicians, regardless of gender.

Q: Do you have advice for young people who might be thinking about doing math? What about early career researchers in mathematics, what advice would you give to them?

SN: Stay patient and stay true to your passions. Celebrate every step forward, no matter how small, and don't wait for recognition to feel proud of your accomplishments. Keep moving forward with dedication and joy in what you do, knowing that your hard work will eventually pay off.



Results of the CWM 2024 Call

In 2024, CWM call received 39 applications, of which CWM decided to support 10. Some of the selected projects aim at supporting continental networks for women in mathematics, such as the Asian-Oceanian Women in Mathematics (AOWM) Workshop in New Zealand and the series of activities organised by the Gender and Diversity Commission of UMALCA (CGD-Umalca) within the Latin American and Caribbean Congress of Mathematics. CWM is supporting networking and visibility activities for women in mathematics in Brazil, India, Malawi, Mexico, Namibia and Senegal, and two research workshops geared towards establishing research networks for women, in Burundi and Uganda. Depending on the nature of the project, CWM funding goes to infrastructure, travel expenses and accommodation support for women participants from developing countries.

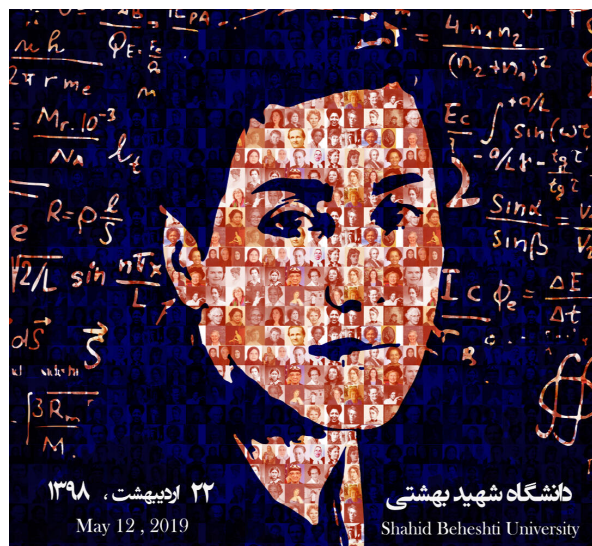
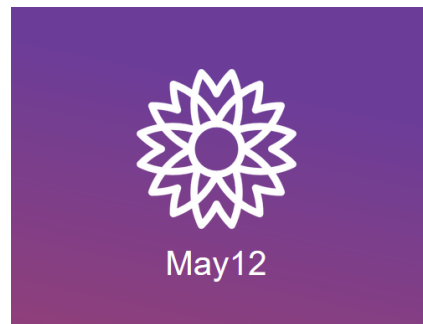
The list of the supported activities follows:

- **Inaugural African Women in Algebra Workshop:** African Women in Algebra (AWA) is an association of African women working in algebra and its applications. It has members from 12 African countries and runs several activities, including a weekly virtual research seminar. The inaugural African Women in Algebra Workshop will take place on July 1-6, 2024, at Kabale University, Uganda.
- **First Symposium of Senegalese Women in Mathematics:** The Senegalese Women in Mathematics Association (SWMA) was established in 2016 to promote mathematics and Senegalese women mathematicians. The first symposium of SWMA will be held in Dakar, Senegal, on August 7-9, 2024.
- **Emphasizing Diversity and Empowerment in Mathematics:** This is a series of activities organised by the Commission on Gender and Diversity (CGD) of UMALCA during the Latin American and Caribbean Congress of Mathematics (CLAM), to take place on August 26-30, 2024, in João Pessoa, Brazil. Activities include round-table discussions and a workshop on Mathematics and DEI (Diversity, Equity, and Inclusion).

- **Women In Sage Burundi:** Since 2007, more than 100 Sage Days have been organised around the world. The 4th edition in Africa will take place on September 9-13, 2024, at Burundi University, with the support of the African Women in Mathematics Association (AWMA).
- **3rd Brazilian Meeting for Women in Mathematics:** The Brazilian Meetings for Women in Mathematics aim to promote a broad discussion on the insertion, permanence and performance of women in mathematics in Brazil. The 1st edition took place in Rio de Janeiro in 2019, and the 2nd edition took place in Belém do Pará in 2022. The 3rd one will take place in the city of Salvador da Bahia, on November 13-16, 2024.
- **Fostering a passion for mathematics amongst women:** This project consists of a panel discussion on education of mathematics aimed at fostering networking opportunities for women mathematicians, to be organised within the Southern Africa Mathematical Sciences Association (SAMSA) annual conference on November 26-29, 2024, in Namibia, and the establishment of mentorship program.
- **Asian-Oceanian Women in Mathematics (AOWM) Workshop:** The Asian-Oceanian Women in Mathematics (AOWM) Workshop will take place in New Zealand from December 6 to 9, 2024. It will be held as a satellite event and prequel of the joint meeting of the New Zealand, Australian and American mathematical societies.
- **Visibility of Latin American Women Mathematicians:** This proposal, led by ICMAM Latin America with the support of Mexican mathematical institutions, aims to increase the visibility of Latin American women in mathematics by disseminating and popularising their scientific work through the creation of audiovisual material and a documentary.
- **Strengthening the work-life balance of African women in mathematics through collaborative research in pairs:** This project from Malawi consists of a week-long workshop, followed by a mentorship program and research in pairs scheme, with a focus on work-life balance of African women in mathematics.
- **Indian Women and Mathematics (IWM) Activities in 2024:** The collective Indian Women and Mathematics (IWM) develops several activities to support women in mathematics, such as workshops, mini-courses, a visitor program, and the IWM Annual Conference which aims to bring together women students, college and university teachers and researchers working at the frontiers of mathematics to exchange mathematical ideas and share their experiences.

The May 12 2024 campaign

In 2018, during the first World Meeting for Women in Mathematics - (WM)², the Women's Committee of the Iranian Mathematical Society proposed to make May 12 a celebration day for women in mathematics, honoring the birthday of Maryam Mirzakhani. This proposal was approved by the participants of (WM)². The call for action has sparked an overwhelming response, and "May 12 - Celebrating Women in Mathematics" has become a prominent global initiative for women in mathematics, spearheading important debates and reflections about the gender gap in mathematics, and encouraging solutions and initiatives to improve the current situation. CWM is proud to sponsor this initiative, which has been coordinated by representatives of various regional organizations for women in mathematics since 2019. The current coordination group is: Christina Brech (Brazil), Paramita Das (India), Mojgan Mahmoudi (Iran), Marie Françoise Ouedraogo (Burkina Faso), Marie-Françoise Roy (France), Elisabetta Strickland (Italy) and Lori Watson (USA). In 2024, May 12 was once again a lively celebration of women in mathematics all over the world. In what follows we give a brief summary of activities registered in the interactive [May 12 website](#) as of May 26, 2024. This does not give the final picture, and the numbers continue to grow. Indeed, the May 12 events can take place between May 1 and June 15 and more events are still being registered. As of May 26, 2024, there were more than 180 events registered from 47 different countries: Argentina, Australia, Austria, Bangladesh, Barbados, Belgium, Bolivia, Brazil, Burundi, Canada, Chile, China, Colombia, Denmark, Ecuador, Egypt, France, Germany, Ghana, Greece, India, Iran, Ireland, Italy, Mexico, Nepal, Nigeria, Norway,



Panama, Papua New Guinea, Peru, Poland, Romania, Russia, Senegal, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Tunisia, Turkey, United Arab Emirates, United Kingdom, United States of America. This year, arrangements have been made with "Les films d'ici" to allow free screenings of two short animated documentaries, "Alicia Boole in the land of polytopes" and "Kovaleskaya's Spinning Top",

in the period of May 1-20. Initially, the films existed in French and English only, with no subtitles. A team of volunteers has produced subtitles in Arabic, English, Greek, Italian, Persian, Portuguese, Spanish and Turkish from the english version. More than 70 registrations of collective screenings of the films have been received. In addition to the countries listed above, collective screenings took place in: Cyprus, Mongolia, Serbia and Uruguay. Additionally, more than 150 individual screening requests have been received, adding to the list of countries celebrating May 12: Algeria, Burkina Faso, Czechia, Israel, Malaysia, Malta, Morocco, Netherlands and Puerto Rico.



Courtesy of SBM. Art by Leonardo Zacarin/Start Communications

An example of an initiative to celebrate May 12 in 2024 was the creation of a mosaic with pictures of women in Mathematics Departments and Institutes across Brazil. This was a joint initiative of the Brazilian Mathematical Society (SBM), the Gender and Diversity Committee of SBM and the Brazilian Society of Applied and Computational Mathematics (SBMAC), and the Mentorship Program of SBM and Brazilian Physical Society (SBF). As they describe it, the mosaic highlights the

diversity of women mathematicians in Brazil, brings visibility and inspires other women to become mathematicians.

News from CWM Ambassadors

- CWM ambassador [Olena Vaneeva](#) from Ukraine was elected corresponding member of the Academy of Sciences of Ukraine. She is only the second woman mathematician that received these high honors. More info [here](#).
- CWM Ambassador [Alicia Dickenstein](#) will preside over The National Academy of Exact, Physical and Natural Sciences of Argentina which celebrates its 150 years of existence. Its board of directors will be renewed and a woman was elected for the first time in the history of the prestigious institution. Alicia Dickenstein has been IMU vice-president (2015-2018) and is CWM Ambassador. More information (in Spanish) [here](#).

In person meeting of CWM 2023-2026

The members of CWM will have their first in person meeting on June 3-4, 2024, hosted by the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy. We are very excited about the meeting and look forward to discussing new ideas for the CWM call 2025, the May 12 Initiative and start planning the third World Meeting for Women in Mathematics, to take place in Philadelphia in 2026.



OTHER NEWS AND ANNOUNCEMENTS

- [Sunčica Čanić named AWM-SIAM Sonia Kovalevsky Lecturer](#)

The Association for Women in Mathematics and the Society for Industrial and Applied Mathematics are pleased to announce that Professor [Sunčica Čanić](#) will be the 2024 Sonia Kovalevsky Lecturer. The Kovalevsky Lecture will be delivered at the 2024 SIAM Annual Meeting taking place in Spokane, WA, July 8 -12, 2024. More information [here](#).

- [Crafoord Prize in Mathematics for 2024 is awarded to Claire Voisin](#)

This year, the Crafoord Prize in Mathematics is awarded to [Claire Voisin](#), Institut de Mathématiques de Jussieu-Paris Rive Gauche, CNRS, France “for outstanding contributions to complex and algebraic geometry, including Hodge theory, algebraic cycles, and hyperkähler geometry”. More information can be found [here](#).

- [2024 Maryam Mirzakhani Prize in Mathematics for Sylvia Serfaty](#)

[Sylvia Serfaty](#), Courant Institute of Mathematical Sciences, New York University, will receive the 2024 Maryam Mirzakhani Prize in Mathematics.

Serfaty has made impactful contributions to the study of nonlinear partial differential equations, variational problems, and statistical physics problems. More precisely, Serfaty has studied problems from condensed matter physics, in particular superconductivity and micromagnetics, Coulomb systems, and vortex dynamics. She has developed fundamentally new techniques for analyzing the dynamics of interacting particles or defects and the spatial patterns they form. Her creative approach and capacity to work on a diverse but coherent family of problems shed new light on the Ginzburg-Landau model of superconductivity and the statistical mechanics of Coulomb-type systems.

You can read the old issues and subscribe the CWM newsletter [here](#).

<https://www.mathunion.org/cwm/about/cwm-newsletter>

Summary of the article

“Rare bugs: Gender and subjectivities in the field of mathematical research in Chile”¹

This text is a summary of the article “Bichos raros: Género y subjetividades en el campo de la investigación en matemáticas en Chile” whose authors are Fernando Valenzuela, Andrea Vera-Gajardo, Tania de Armas, Consuelo Dinamarca and Felipe Águila. The article was published in the Journal Psicoperspectivas in 2022.

Introduction

"It looks like a rare bug," a mathematician tells us about a woman studying for a degree in mathematics in Chile. This image of the rare bug refers to three main topics that have organized the understanding of the processes of construction of subjectivities of female academics and scientists: otherness, incongruence, and invisibility.

The figure of otherness has primacy in this context. As Estela Serret has observed, the artificial ordering of the world in symbols is represented in terms of gender: "masculine as culture (order, world, self, us, good, clarity, comprehensibility...) and feminine as nature (chaos, nothingness, enemy, other, evil, darkness, enigma)" (Serret, 2006, p. 92). When this otherness is reflected in the genericized delimitation of fields of activity, women occupy the position of "outsiders" or "foreigners" in the social order (Harding, 1991), generating an incongruence between the performance of leadership roles and prestige in these fields and the stereotypical forms of femininity that grant them visibility (Faulkner, 2011).

This has been widely documented in the fields of knowledge production in different latitudes (Buquet Corleto et al., 2013; Fardella et al., 2021; Martínez et al., 2019; Martínez-Labrin, 2015; Ríos González et al., 2017), including the case of mathematics (Barany, 2021; Day, 1997; Hottinger, 2016). However, the notion of otherness that cements these lines of inquiry has tended to be interpreted in a univocal sense that prevents to account for distinctive aspects of each field.

(1) Original article: Valenzuela, F. A., Vera-Gajardo, A., De Armas Pedraza, T., Dinamarca Noack, C., & Águila Humeres, F. (2022). Bichos raros: Género y subjetividades en el campo de la investigación en matemáticas en Chile. *Psicoperspectivas*, 21(2). <https://dx.doi.org/10.5027/psicoperspectivas-vol21-issue2-fulltext-2478>

Through the analysis of 11 focus groups (FG) in which 20 female mathematicians and 42 male mathematicians from different regions of Chile participated, this article seeks to deepen the understanding of the processes of construction of subjectivities of women in this field of research in Chile. Our results shed light on two intertwined dimensions of this phenomenon. As a first result, we observe that the notion of strangeness that articulates the construction of subjectivities of women mathematicians has a polysemic character. In addition to an experience of disciplinary strangeness, which tends to be shared by all those who participate in the field of mathematical research, there are two other forms that mark women's subjectivities. Following the distinction drawn by Wendy Faulkner (2011), we distinguish between the statistical rarity of those who recognize themselves as belonging to a minority within the field and the normative otherness of those who feel that they occupy a position that society has assigned to others. Both forms converge in the image of the "rare bug". As a second result, the theory of ambivalent sexism (Connor et al., 2017) allows us to deepen our understanding of the discursive forms that make female mathematical academics invisible as occupants of positions of leadership and prestige, while at the same time making them visible according to stereotypical forms of femininity.

The recomposition of the university field according to a logic of commodification (Bleiklie, 2018) has had a correlate in the constitution of new forms of subjectivation, understood as discourses, practices and devices through which individuals attempt to "elaborate, transform and access a certain mode of being" (Foucault, 1999, p. 394). These means that have traditionally been available to academics to accumulate prestige have been quantitatively translated in terms of "productivity" (Fardella et al., 2019) and positioned as academic performance goals that condition permanence and job progression (Sisto, 2020).

In the literature we can distinguish three main ways in which these new academic subjectivities are articulated in women's trajectories: sexual division of academic labor (Hottinger, 2016; Fardella et al., 2021), experience of identity incongruence in women who develop specifically in STEM disciplines (Day, 1997; Faulkner, 2011) and deepening of the "merit repertoire" (Fardella et al., 2019).

The results presented in this article are based on a qualitative discursive content analysis (Sayago, 2014) of 11 FG conducted between April 2019 and June 2020 in Chile.

The data interpretation process followed an iterative strategy of qualitative analysis of discursive content, in which passages were labeled and disaggregated to perform abductive categories (Sayago, 2014). Each transcript was analyzed by subgroups of the research team, resulting in analytical proposals that were discussed

in three group sessions and informed the final confection of an analysis matrix that was applied to the complete corpus using Atlas.ti software.

Forms of Rarity and Otherness

The mixed and women's FG alluded to a common experience of rarity, characteristic of those who are part of a little visible minority that inhabits and reproduces a largely unknown and misunderstood, but strongly structured, social field. In their perspective, fewer and fewer people are choosing mathematics as a path of specialization., "We are in danger of extinction" (Female, Mixed FG), in their words. Added to this is the fact that the practices and norms of the field seem to be completely foreign to others. As another interviewee expresses: "It is super complex to talk about mathematics to someone that has not studied mathematics. It seems to me that they always... always think that one does addition, subtraction, multiplication and division, and work with numbers" (female, mixed FG). This experience of disciplinary rarity, shared by all of those who participate in this field, will mark the experience of women academics. Unlike other strongly masculinized fields, being a female mathematician will imply a double movement of marginalization (Henrion, 1997): first with respect to generalized expectations about the construction of career paths, and then within the mathematical community itself.

In addition, there are two other forms that mark the subjectivities of women. In the following words of a female mathematician, one can observe the progression from that first sense of queerness, related to the closure of the field, to a different one, based on a gender scheme:

"I had entered pedagogy, because I wanted to enter mathematics, and in the end I went that way. Then I changed... of course, I didn't know that I looked like a rare bug too, because, imagine, nobody changes to a bachelor's degree, especially not women (Women's FG)".

According to this participant, if it is already rare for anyone to opt for a degree in mathematics, it is even rarer for a woman to do so. In her words, "she looks the rare bug".

On the one hand, coinciding with the identification of agentic ability with masculinity (Eagly & Karau, 2002), the male figure of genius promises to fulfill the expectation that certain stable internal attributes could explain success in the field. Genius, however, seems to be a male attribute. One participant recalled a documentary, where he had found confirmation of this gender complementarity: "...when you see fewer women it is in certain disciplines that are associated with a kind of genius [...] women are hard-working, that's why they do well" (male, mixed FG). In the present context, this expression is interesting because of the schema on

which it is based - and which it reproduces. While the male stands out for his genius, the female mathematician stands out for her effort. As one participant said: "I am absolutely normal, but a hard worker" (women's FG). Both figures, opposed and hierarchical, are illustrated in several accounts in the women's FG.

In coincidence with what previous studies have pointed out (Day, 1997), it is observed here that, at the symbolic level, being a woman and studying for a degree in mathematics implies a contradiction.

In this third sense, strangeness does not refer to the experience of those who belong to a strongly closed community, nor to that of those who are in a condition of gender underrepresentation. To be "the others in that space" (women's FG) is to embody the otherness of normative masculinity. It is a form of otherness that corresponds to those who feel that they occupy a position that society has assigned to others.

The above results are consistent with research that has observed that the normative masculinization of professional fields has an impact on subjectivation processes through the development of experiences of inauthenticity or gender incongruence (Faulkner, 2011). This translates into a paradox, according to which the relative invisibilization of women in roles of prestige and leadership (Eagly & Karau, 2002) coincides with their visibilization under stereotypical forms of femininity (Faulkner, 2011).

We propose the theory of ambivalent sexism (Connor et al., 2017) to deepen the analysis of the discursive forms that perpetuate this condition. This theory anticipates the prevalence of sexist discourses articulated around three axes: paternalism, heterosexuality, and gender differentiation. These discourses would be ambivalent to the extent that, in each axis, hostile attitudes coexist with benevolent attitudes. In the latter modality, expressions and behaviors acquire a positive meaning for those who enunciate them, which may coincide with the interpretation of those who are their object. This contributes to perpetuate sexist structures, by reproducing their founding schemes without arousing conflict (Connor et al., 2017; Jackman, 1994).

In the FG it is possible to observe how these three axes articulate the discourses of those who participate in the field of mathematical research in Chile. Beyond what is proposed by this analytical framework, it is observed that hostile modalities tend to be replaced by ambiguous statements or behaviors. We propose that this characteristic contributes to perpetuate sexist structures in areas such as academia, where hostile modalities are more frequently sanctioned.

Conclusions

In this article, we have explored the processes of construction of gendered subjectivities in the field of mathematics research in Chile. It is based on 11 focus groups - seven mixed and four of women - with mathematicians from different regions of the country. The results illuminate two intertwined dimensions of this phenomenon. On the one hand, we distinguish three senses of the notion of strangeness that articulate the construction of subjectivities of women mathematicians: disciplinary, statistical and normative. In addition, we deepen our understanding of how these forms of strangeness are linked to the reproduction of sexist discourses that make them invisible as occupants of prestigious positions, while at the same time making them visible according to stereotypical forms of femininity. Applying the theory of ambivalent sexism, we suggest that these discourses are articulated in benevolent and hostile ways around three stereotypical figures: defenselessness, motherhood, and the object of male desire. We propose that ambiguous modes of expression collaborate to perpetuate the sexist structures of the field. These findings contribute to the analysis of the field of mathematics research from a gender perspective.

Bibliography

- Barany, M. (2021). "A young man's game": Youth, gender, play, and power in the personae of mid-twentieth-century global Mathematics. In K. Niskanen & M. Barany (Eds.), *Gender, embodiment, and the history of the scholarly persona: Incarnations and contestations* (pp. 21-53). Palgrave Macmillan.
- Bleiklie, I. (2018). New Public Management or neoliberalism, higher education. In *Encyclopedia of international higher education systems and institutions* (pp. 1-6). Springer Netherlands.
- Buquet Corleto, A., Cooper, J., Mingo, A., & Moreno, H. (2013). *Intrusas en la universidad*. UNAM, Coordinación de Humanidades, Pueg: IISUE.
- Connor, R. A., Glick, P., & Fiske, S. T. (2017). Ambivalent sexism in the twenty-first century. In *The Cambridge handbook of the psychology of prejudice* (pp. 295-320). Cambridge University Press.
- Day, M. C. (1997). *From the experiences of women mathematicians: A feminist epistemology for Mathematics* [Thesis presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Mathematics and Women's Studies]. Massey University.
- Eagly, A. H. & Karau, S. J. (2002). Role congruity theory of prejudice toward female leaders. *Psychological Review*, 109(3), 573-598.
- Fardella, C., Corvalán, A., García, J., & Chiappini, F. (2021). Ni extranjeras, ni secretarias: Discursos de las científicas chilenas sobre el trabajo académico. *Pensamiento Educativo: Revista de Investigación Educativa Latinoamericana*, 58(1), 1-13.
- Fardella, C., Corvalán, A., & Zavala, R. (2019). El académico cuantificado: La gestión performativa a través de los instrumentos de medición en la ciencia. *Psicología, Conocimiento y Sociedad*, 9(2), 77-103.

- Faulkner, W. (2011). Gender (in)authenticity, belonging and identity in engineering. *Brussels Economic Review*, 54(2/3), 277-293.
- Foucault, M. (1999). La ética del cuidado de sí como práctica de la libertad. In *Estética, ética y hermenéutica. Obras esenciales III* (pp. 393-416). Paidós.
- Harding, S. (1991). *Whose science? Whose knowledge? Thinking from women's lives*. Cornell University Press.
- Henrion, C. (1997). *Women in Mathematics: The addition of difference*. Indiana University Press.
- Hottinger, S. N. (2016). *Inventing the mathematician: Gender, race, and our cultural understanding of Mathematics*. State University of New York Press.
- Jackman, M. R. (1994). *Velvet glove: Paternalism and conflict in gender, class, and race relations*. University of California Press.
- Martínez, C., del Campo, V., Palomera, P., Vanegas, C., Montenegro, M., Hernández, C., & Ramos, E. (2019). Experiencias formativas de mujeres en carreras de ingeniería: Caracterización de prácticas que incentivan la inclusión y equidad. *Comisión Nacional de Acreditación*.
- Martínez-Labrin, S. (2015). Género, subjetividad y trabajo académico. *Investigación Académica en Psicología*, 3(8), 47-53.
- Ríos González, N., Mandiola Cotroneo, M., & Varas Alvarado, A. (2017). Haciendo género, haciendo academia: Un análisis feminista de la organización del trabajo académico en Chile. *Psicoperspectivas*, 16(2), 114-124.
- Sayago, S. (2014). El análisis del discurso como técnica de investigación cualitativa y cuantitativa en las ciencias sociales. *Cinta de Moebio*, 49, 1-10.
- Serret, E. (2006). *El género y lo simbólico: La construcción imaginaria de la identidad femenina* (2a ed.). Instituto de la Mujer Oaxaqueña.
- Sisto, V. (2020). Desbordadas/os: Rendición de cuentas e intensificación del trabajo en la universidad neoliberal. El caso de Chile. *Education Policy Analysis Archives*, 28, 1-26.



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