THE LESSON WE CAN LEARN FROM THE CANADIAN DOCUMENTARY "MS. SCIENTIST" TO HAVE MORE WOMEN IN SCIENCE

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Abstract

Around the world the fields of scientific research and development remain a male-dominated environment. Workplace with worse gender ratio has proven as the greatest predictor of the occurrence of sexual harassment. A system-wide change to the culture and organizational climate in science is required. The Canadian documentary "Ms. Scientist" by Brandy Yanchyk explores how Canada is trying to get female scientists to stay in the fields of science and progress to the top. Ms Scientist looks at the successes and challenges that ten Canada's women in science face, and provides guidance and inspiration for young women and minorities who embark on a career in science all over the world.

Keywords: Sexism, Harassment, Women in science, Unconscious bias, Universities

Riassunto

In tutto il mondo, i campi della ricerca e dello sviluppo scientifico rimangono un ambiente dominato dagli uomini. Un posto di lavoro con il peggiore rapporto di genere si è dimostrato il più forte predittore del verificarsi di molestie sessuali. È necessario un cambiamento di sistema nella cultura e nel clima organizzativo delle istituzioni scientifiche. Il documentario canadese "Ms. Scientist" di Brandy Yanchyk esplora le modalità attraverso le quali il Canada stia cercando di indurre le scienziate a rimanere nei diversi campi della scienza e di fare carriera fino ai livelli più alti. Ms Scientist guarda ai successi e alle sfide che affrontano dieci donne canadesi nel campo della scienza e fornisce indicazioni e ispirazioni per le giovani donne e per i membri di minoranze che intraprendono una carriera scientifica in tutto il mondo.

Parole chiave: Sessismo, Molestie, Donne nella scienza, Pregiudizi inconsci, Università

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1. INTRODUCTION

Academies are progressively developing, though at slow rate, awareness on the many routes along which gender differences in fact turn into discriminations, thus transforming a powerful engine for scientific and social community development into a self-snagging equally powerful hamper. In fact, an inclusive approach would recognize and exploit the different manners in which also underrepresented groups of scientists would act their creativity, competences, communication, and leadership, thereby resulting into a most skillful, fostering, and fertile environment.

For this reason, an increasing level of commitment and planning is taking place, aimed to practice in scientific careers mainstreaming and empowerment of gender diversities in academic organizations.

However, if the expansion of support networks in campuses and communities is encouraging more women to speak out about discrimination and harassment, institutions and scientific societies have been slow to take action and to adopt anti-harassment policies. This means that the victims live in fear of retaliation and have to face the professional consequences of having reported the harassment.

As pointed out by Vijayaraghavan and colleagues [2017] a change needs to take two directions: at the levels of laws and social norms.

The latter has started and as a cultural change will take time. Scientists, academics and professional associations are called upon to raise awareness of diversity issues in a male-dominated system. This can be achieved by improving the visibility of female scientists in the media, profiling a greater number of female models in scientific fields, holding scientists accountable, and reporting unacceptable behaviours. We must also take into account that this change starts at school: "Gender differences and stereotypes count, but the school system and the educational relationship can make the difference", therefore, "In this framework, tailoring the educational intervention on diversity and offering role models work for gender mainstreaming and women empowerment: increasing gender diversity in the educational relationship can make the difference to change the sign of the OECD data" [Chiofalo 2014].

The change in laws requires institutions to be willing to implement targeted legislation to create safe working environments. This structural change can be achieved more quickly by the suspension of funding to scientists who have

committed harassment, as announced by the National Science Foundation in the United States [Kuo 2018] and by national legislative actions promoting gender equity in science, as the plan introduced by the Canadian Minister of Science Kirsty Duncan forcing universities to improve the diversity of gender, race or heritage at each level of the academic career.

2. CULTURAL AND STRUCTURAL CHANGES ADDRESSED IN *MS. SCIENTIST*

The documentary *Ms. Scientist* was released in September 2018 and is available online.

The documentary represents a powerful tool to think about a contemporary and unfortunately evergreen problem in the most dramatic manner. In fact, one would expect that stereotypes and inequalities be clearly absent in one of the temples of knowledge and culture, that is the academic system, and even more evidently in science, where facts checking and critical thinking represent the quintessential characters permeating all activities. Unfortunately, this is not the case, and therefore we are led to consider that the existence of stereotypes and unequal opportunities in science represents a most dramatic measure of how deeply is the problem rooted in society. Academies are eventually moving their first steps along the path of increasing awareness and the level of action to surpass the problem and recognize the extraordinary value of the many resources that women can bring to the advancement of knowledge, innovation fostered by different routes for creativity, management of the academic system, and to inspire different policies thinking. Thus, this is a perfect timing for an inspiring tool as *Ms. Scientist* is. Also, *Ms. Scientist* brings into the discussion two essential ingredients. First, the pivotal importance of the quality of the story-telling, and in particular of recognizing women's contributions in a specific and robustly grounded – not generic – way, connecting to given scientific results true stories, real faces and names. Second, the need to involve government institutions and policy makers all levels, in a cooperative and coherent manner. These two ingredients are hard-wired by two among the most women-archetypical invisible links: engendering and web weaving. Web weaving and engendering are both practices with a powerful impact in building up a

peaceful and productive leadership, in turn necessary to operate real changes and deep transformations.

3. THE STORY-TELLING: THE SCIENTISTS FEATURED IN *MS. SCIENTIST*

The filmmaker Brandy Yanchyk profiles ten Canadian women in science. Yanchyk's interviews are conducted in the laboratory or in the fields where each scientist works and talks about her research, the stereotypes, barriers, harassment, unconscious bias she has faced and the personal and professional achievements. *Ms. Scientist* traces their lives and highlights the obstacles that have slowed their success, such as sexism, discrimination, harassment and the balancing of work and family life. Each story traces routes to overcome current obstacles through commitment and passion for science, and each scientist becomes a model capable of inspiring new generations of researchers. The first recipients to benefit from these models are the students and collaborators of the women scientists, who start their careers in a more inclusive environment.

There are ten women in science interviewed by Brandy Yanchyk at their workplace. We will list them in order of appearance, briefly highlighting the challenges of their careers. All of them are now heads of department or research-group leaders and have received important awards.

Anne Salomon is an applied marine ecologist and assistant professor at Simon Fraser University's School of Resource and Environmental Management in British Columbia. With her students, she conducts field-based research to understand the dynamics of coastal ecosystems. She was sexual harassed as a graduate student researcher and she found "the courage to reach out for help". She delayed maternity, having her second child at 43 years old because to manage "a family and a career in science is difficult for women".

Monica Gorassini is Professor in the Department of Biomedical Engineering in the Faculty of Medicine and Dentistry at the University of Alberta and Principal Investigator in the Motor Control Laboratory. She conducts her research on the mechanisms of spasticity after spinal cord injury and after cerebral palsy and on motor training and the recovery of walking. She faced sexism and discrimination: at the beginning of her career the dean offered her a lower position and less money compared to her male colleagues.

Kirsty Duncan before being named Minister of Science, Sport and Persons with Disabilities was a scientist and an associate professor. At that time, she was paid 10% less than her male colleagues. Now, her mission is "to change the course, to address the challenges we need" and to give equal opportunities of academic career to women, indigenous people and other underrepresented groups.

Catherine Field is a professor of Nutrition at the University of Alberta and she is studying on the effect of nutrition on the immune system. She devotes many hours of each day to research, trying to balance her work with family life.

Jaynie Yang is a professor and researcher at the University of Alberta's Faculty of Rehabilitation Medicine. Born in Taipei, Taiwan, she completed an undergraduate degree in physical therapy at Queen's University, Ontario. Her research focuses on motor training in children with perinatal brain injury and neural mechanisms underlying the retraining of walking in adults with spinal cord injury. She explains how difficult it is to combine scientific activities with the needs of the family and children: "the time that you can have children is also the time that is really important for your career".

Lynn Moorman is Professor at Mount Royal University where she teaches physical geography and spatial analysis in the Department of Earth and Environmental Sciences and in the Department of General Education. Her research explores the role of geospatial technologies in the construction of people's geographic knowledge. Negotiating her maternity leave was complicated and to pursue her career she admit that "you have to bring the baby with you". When she put her family first she had negative feedback.

Carla Prado is an assistant professor at the University of Alberta in Canada, and a Campus Alberta Innovates Chair in Nutrition, Food and Health. She is the Director of the Human Nutrition Research Unit. Her research is focused on the physiology and causes of nutritional problems assessed through the precise measurement of body composition and energy metabolism. The challenges during her career stemmed from being a woman and Hispanic scientist. To better reconcile scientific work and family life at the beginning of her career she admits "we were creative enough to balance life". She has fewer challenges to face with current pregnancy. She has also been discriminated for her clothes and make-up, "people telling me I don't look like

a scientist", as if there is always a need to choose between *being pretty or being smart*.

Lynne-Marie Postovit is an associate professor in the Department of Obstetrics & Gynecology at the University of Alberta. She is an expert in the area of women's cancers, and her research group program is to determine what types of microenvironments regulate normal and cancer stem cell plasticity and function. Her story tells about the unconscious bias towards women with a family and the difficulties of work and life integration.

Jackie Dawson is the Canada Research Chair in Environment, Society, and Policy and is an Associate Professor in the Department of Geography, Environment, and Geomatics at the University of Ottawa. She is an international expert in Arctic marine transportation, Indigenous community development, and oceans governance. The experiences she tells show how unconscious bias can lead to discrimination at scientific conferences. As a gay woman in science she brings attention to the discrimination LGBT scientists still face in science fields.

Luda Diatchenko is a professor at McGill University, the first woman to hold a Canada Excellence Research Chair (CERC), and the Principal Investigator of the Human Pain Genetics Lab. Her lab investigates the psychological, molecular, cellular, and genetic pathways that mediate both acute and persistent pain states. She express her commitment and life dedication to science and also the learned adaptation for "through my career I usually was the only woman in the room".

4. INSTITUTIONAL COMMITMENT AND POLICY MAKING IN *MS. SCIENTIST*

However, the construction of a more inclusive environment cannot be left only to individuals, it must be coded via competent, integrated, and diffused policy-making, and promoted through institutions addresses acted by their (accountable and credible) representatives. In April 2017, Kirsty Duncan, Canada's Minister of Science, Sport and Persons with Disabilities Canada's Minister of Science, and former scientist, started asking the right questions, in fact as a trained problem-solver would do. For example, independently of the present number of women in top posts, that is the result of an already sick past, she addressed the question whether women scientists in Canada were

progressing through the ranks at the same rate and at equal pay as their male (or minorities belonging) colleagues. A negative answer to this question, as it in facts emerged, would have clearly led to seriously consider quotas, i.e. a positive action, as a necessary measure to establish gender equilibrium. Thus, she decided to implement equity rules for the Canada Excellence Research Chairs program and, tough enough, threatened to withhold Canada Research-Chairs funding from those universities that were not meeting equity targets within the reasonably pressing period of two years.

CONCLUSIONS

Besides being wrong in terms of principles and rights, gender bias and discriminations demonstrate to be very effective in leaving women's intellectual resources unused and innovation potential unexpressed, via horizontal and vertical segregation. The measure of the innovation potential is quantitative – as it is related to more than half the population – and qualitative – in view of the different routes for creativity, problem solving, and leadership, that a gender diverse environment may foster. In fact, discriminations are the result of (beneficial) differences made stiff by stereotypes, and of mistaking equality of opportunities for absence of differences. Discriminations significantly persist across the most diverse cultures and societies, and live even in scientific environments, leading to infer that they are even more deeply rooted in society as a cultural bug, in general and also when referred to other diversities. Overall, gender bias and discriminations very effectively work as powerful hampers to knowledge advancement, process innovation, and eventually individual and community development.

Mainstreaming and empowerment are the powerful concepts emerging from the 1995 Pechin Worldwide Women Platform, that should inspire decision making addressed to crumble horizontal and vertical segregation away, respectively. Though significant progress is being pursued, especially in selected countries and in scientific environments, communities are generally very far from even fostering these concepts in their governing policies, notwithstanding apply them in everyday life. In fact, we believe that a radical change of perspective is needed, in which women practices like web weaving and engendering play a pivotal role.

The documentary *Ms. Scientist* by Brandy Yanchyk represents an interesting food for thoughts as it inspires, from a true story of real women scientists and government leaders, an accessible and viable path in an otherwise uneven and long route.

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BIOGRAPHY

Maria Luisa Chiofalo

Scientific area

Education. Graduation in Physics (University of Pisa, Italy, 1992, 110/110 *magna cum laude*). PhD degree in Physics (Scuola Normale Superiore - SNS, Pisa, Italy, 70/70 *magna cum laude*).

Position Associate Professor (University of Pisa, current position since 2007). She has received the Italian National Qualification as a Full Professor.

Teaching. General Physics. Statistical Physics. Mathematics. Physics of everyday life. Many-body physics, at both Masters and PhD level. She is active in physics education and development of novel physics education methods. She has been appointed as coordinator of the national team aimed to update the syllabus and assessment physics tests for Pharmacy Faculties (2016 e 2017). She contributes to 15 academic bodies among boards, committees, and councils related to teaching and research activities.

Principal Investigator in the following granted research projects. Two granted by INFM-CINECA ("Simulation of dynamical behaviour of confined quantum fluids", "Quantum degenerate atomic gases with tunable interactions"). Two granted by Scuola Normale Superiore ("Mesoscopic superfluidity: theoretical advances and novel applications", "Resonant superfluidity and nature of the normal state in strongly degenerate quantum atomic gases", "Atomtronics"). Project WP4250 granted by the Italian Space Agency ASI, within the WP4000 on "Fundamental Physics in Space". MIT-Unipi program "Generation of spin-squeezed states for fundamental physics tests by atom interferometry" (2015-2017). Project MAGIA-Advanced, granted by INFN (national coordinator Professor Guglielmo Tino) aimed to realize a large-momentum transfer atomic interferometer for fundamental physics tests, and in particular Equivalence Principle tests and detection of Gravitational Waves (2015-2018).

Political and Institutional area

Women Associations. Co-founder of the MAMI- Pisa, Italian expression of the UNICEF World Alliance for Breastfeeding Actions, where she has: (i) contributed to conceive projects to promote WHO health-care recommendations; (ii) worked as MAMI representative in the City-Hall Council for Equal Opportunities (CPO) of the Comune di Pisa (1998-2002). Member of the Italian Association of Women and Science and of the network Women for Intelligent and Smart TERritories. Member (elected) in the Board of the Alumni Association of the Scuola Normale Superiore (Pisa, Italy).

Institutional activity as president of the CPO of the Comune di Pisa (2003-2008),

Tiziana Metitieri is a Consultant Neuropsychologist at the Child Neurology Unit of the Pediatric Hospital Anna Meyer-University of Firenze, Italy. Since 1997 she has carried out clinical and research activities in the psychological and neuropsychological fields. She collaborates with an association for gifted children providing assessment, counseling, and training for teachers and clinicians. Through a science communication blog, she writes about neuropsychological cases, psychological issues, and women in science. In 2016, together with two co-authors, she was awarded a grant by the History Committee of the Federation of European Neuroscience Societies to start the multimedia project Untold Stories: the Women Pioneers of Neuroscience in Europe, aimed at researching and communicating the innovative work and extraordinary lives of the forgotten women pioneers in neuroscience.