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EDITORIAL / ANALYSIS

Leading women in Science: Why are we still so few?

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This is probably one of the questions that has received most attention in the last 15-20 years. In my opinion, the question is way too complex to be answered with a few facts.

After extensive research worldwide, it is clear that the intellectual capacities of men and women for natural and physical sciences are the same [1,2]. Acknowledging the abnormally low number of women in Science and in a true effort to recognize their *talent* and *added value*, several different policies have been implemented, both in USA and Europe, to increase female participation in Science. Indeed, things have improved a lot since my early days when I was doing my PhD at Imperial College (1989-1993). The building where I was doing research had ten floors, with only one female bathroom on the sixth floor, where all the administrative personnel (mostly women) were also located. But why would you need more female bathrooms? After all, we were only two females in the entire building doing the PhD at that time… In the Netherlands, where I moved years later, we had shared toilets (pragmatic Dutch approach…). Now, at my current institute in Barcelona, there is an equal number of toilets for women and men. We indeed have gained some equality! However, we need much more than this.

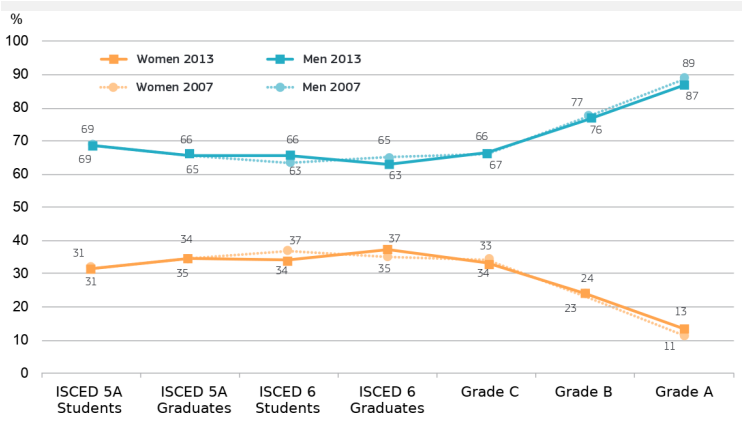

Figure 1. Percentage of women and men in academic careers in science and engineering, students and academic staff (EU-28, 2007-2013). ISCED 5A students = bachelor level, ISCED 5A graduates = master's level, ISCED 6 students = PhD level, ISCED 6 graduates = Postdoc level, Grade C = Assistant Professor, Grade B = Associate Professor, Grade A = Full Professor. Taken from [3].

Compared to 20 years ago, the percentage of women starting their undergraduate studies in Science

and Engineering has increased to ~30%, not yet fully equal, but a proof that positive changes are occurring at the early stages of scientific training [3]. It also shows that girls have a genuine interest in these areas (a cheap excuse that has been often used to explain the low number of women in these careers). Yet, as we move up in the ladder, these numbers decrease dramatically, a trend that has not changed at all during the years, despite the implemented policies [3] (see Figure 1). What are the reasons? Have these measures failed?

There is certainly more flexibility regarding *maternity leave* and *childcare* (at least in Europe). I was recently talking to a female colleague Professor in Sweden, the paradise country for maternity leave. Yet, she told me that within a couple of months after giving birth, e-mails traffic decreased, the number of decision-making meetings she was not invited to increased, etc. The result: she continued working at home while breast feeding and changing pampers, and started working as soon as she could, before being completely ignored by her Department.

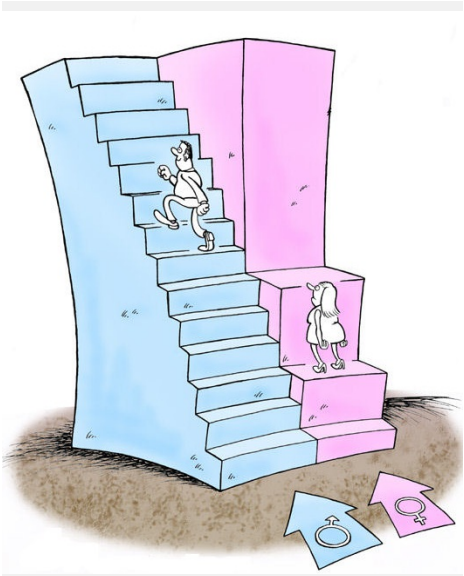

Figure 2. It does not need a description.... Taken from Science with and for Society – SwafS (European Commission).

Positive discrimination is another flawed policy. In my opinion it has done much more harm to us that real discrimination: Hearing comments at conferences or meetings linking the success of women to the "advantages" of their condition, and disregarding their true scientific capacity is common. Another flawed policy is to "force" equal participation of women and men in evaluation committees, conferences, editorial boards, etc. An excellent idea (in principle) to produce real changes in the system, but how could you possibly have 50% women participation in these events, if we barely account for 10-12% of senior professorship? The result (from my own experience) is that we get entangled into an enormous amount of commitments because we are always the same ones... with less time to be in the Lab doing actual research, which in turns works against our productivity level. Irritatingly enough, we are being approached to meet the equality criteria, rather than as a recognition for our merits.

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So yes, I think that these measures have failed: good intentions but no real improvements. Women face many more and greater obstacles than men in order to attain a senior position (Figure 2). Maternity is a fact, but in my opinion (and again from personal experience) is more of a myth rather than a real, permanent obstacle. Although significantly more difficult for women than for men, having a family should not constitute the reason for slowing down research or giving up women career ambitions. Open and obvious discrimination is hardly a reason or obstacle nowadays to stop women from climbing up the ladder to senior positions. Society has evolved and so have our rights. However, unconscious discrimination is undoubtedly there, surrounding us continuously from very early in our

careers (if not childhood), harming our *self-esteem* in a subtle but extremely effective way, to the extent that we are not even aware of it.

> **Maternity is a fact, but more of a myth than a permanent obstacle**

The truth is that doing excellent Science and reaching the top is awfully difficult, both for women and men. First, you need to be very smart. Second, it takes a titanic amount of time, commitment and effort. As already mentioned, women are as smart as men. This is not the problem. Do we have the time? and, are we willing to invest all the effort that it takes?

Time, dedication and commitment comes with hyper-focusing, making being successful in Science the first, and probably only priority in life. Despite the pragmatic facts that consume time and are not yet equally balanced (children, family, house-keeping etc), women are naturally more versatile, with broader interests in life and multi-task oriented. Obviously, this scatters the focus… but, women tend to work harder and longer hours to compensate for it. Thus, time constrains do not constitute the major reason either. The last point, is the effort and the sacrifices it takes to reach the top. Is it worth it? I am convinced it is, if you really love Science. Absolutely yes, if you are passionate about understanding the mysterious secrets of life and the laws of Nature. Here it is where I believe the difference between women and men comes into play. Men have been nourished and encouraged to be the best, to win since they are children, to reach as high as they possibly can, and of course very importantly, to enjoy their success, get pride and recognition for it. All these, feed into their egos' and boost their self-esteem. Armed with these battery of tools, they are ready to do whatever it takes to succeed in Science. Women have been swamped with continuous subliminal messages of discouragement, unrecognition, depreciation, fragility and inadequacy from our surrounding, even from our closest men colleagues, the ones we admire the most (unfortunately, some times, even from women).

> **Men have been nourished to be the best… Women have been swamped with continuous subliminal messages of discouragement**

Egos in Science are a big deal. How could we possibly keep our egos high and compete with those of our men colleagues, when our self-esteem is being continuously bombarded? This constant battle adds to the huge effort that women need to invest in to attain to the highest level. The result: despite a passion for Science and a brilliant mind, many women end-up quitting with the frustrating feeling that "I am just not good enough for Science".

Unless we seriously appreciate the huge negative impact of unconscious discrimination, and work hard on eradicating it from our societies, genuinely recognizing the talent of women in Science, things will not really change; no matter how many childcare and/or institutional policies are implemented.

Of note, while writing this comment, several of my female colleagues pointed out to me the positive influence that role models and mentoring have had in their careers. It is therefore of highest importance to share our experiences with young women researchers and to encourage active policies to mentor them on their way to the top.

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