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LOOKING GENDER AND SCIENCE AT MICRO LEVEL: NARRATIVE IDENTITY AND THE SOCIALIZATION OF MASTER NARRATIVES

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ABSTRACT

The paper focused on the role and socialization of master narratives about gender differences in attitudes toward science – cultural narratives place the various disciplines within a continuum that ranged from female to male: biology and other life sciences were on one end of this spectrum, while physics and engineering were on the other – by focusing on self-representation of a specific group of women who successfully achieved an academic career in engineering. In the study the Ricoeur's concept of narrative identity is used to understand how women engineer active (and creative) negotiate their personal narratives within the above-mentioned cultural expectations. The introduction of a temporalised understanding of the self that the idea of narrative captures allows to overcome certain oppositions around which much thought on identity tends to revolve, notably the dualism of essential (stasis) versus constructed (change) concepts of identity and that of authentic experience versus ideological distortion.

In this pilot study we interviewed all the female full professors and the 60% of female associate professors enrolled in Engineering Departments (n = 14) of the University of Pisa (Italy) in order to collect their self-representation and their conformity and deviation narratives, as well as their socialization experiences regarding gendered master narratives. The findings suggest the crucial role of socialization process and of the master narrative of gender roles and of gender and science which become the basis for the reflexive understanding and of the construction of narrative identity. In many cases we found a complex relation between socialization messages about gender roles/models/attitudes and master narratives about gender and science, that result in narrative identity which emphasizes a tomboy self-representation, that is an alternative way to interiorize the traditional construction of gender attitudes in science. We have to consider carefully this process in particular for policies that aim to offer a counternarrative on gender and science by using "female scientists" as ambassadors.

Keywords: *narrative identity, gender identity, master narratives, cultural change, socialization*

1. Introduction

By analysing the persistent underrepresentation of women in science – which remains proportional to the responsibility and prestige associated with the role held and with the discipline, as is evident in the scientific/technological field, but even more so in engineering (August and Waltman, 2004; EC, 2016) – the international literature has adopted different perspectives. Many scholars propose a systematic review of the scientific literature on this topic, by highlighting the multiplicity of approaches that have evolved and changed in time (Kahle and Meece, 1994; Osborne, Simon and Collins, 2003; Brotman and Moore, 2008; Cama, Jorge and Peña, 2016).

An analysis of these papers shows a circular development, starting and ending with a micro / individual level, after crossing the meso / organizational level, the macro / institutional level and, finally, the constructive approach that look at science as a social product. Initially, the attention was focused on the micro level and on the interactions and friction of the process of socialization in gender and in science (Clark and Corcoran, 1986; Long, 1990). This was subsequently integrated with macro approaches that enabled scholars to highlight the presence of systemic obstacles and barriers, both at a societal and regulatory level (Cook, 2001; Rosser, 1999, 2004; Rosser and Lane, 2002; Settles et al., 2006). At the same time, analyses focusing on the observation of the phenomenon at meso level focused on the dynamics of the interaction between caregiving obligations and research responsibilities (Xie and Shauman, 2003; Joecks, Pull and Backes-Gellner, 2014). Feminist literature is also worth mentioning, which, starting from Fox Keller (1978), Merchant (1980) and Harding (1986), highlights the androcentric matrix and its implication in the female participation in science. The more recent approach emerging in the gender and scientific literature comes from a poststructuralist perspective and focuses on identity and the attempts to understand the role of identity in female engagement in science, where gender is considered part of the social construction process, and avoids simplistic and essentialist binary oppositions between "female" as one unitary group and "male" as another (Brotman and Moore, 2008).

In order to face the post-structuralist deconstruction of idealist and unified notions of the subject and associated emphasis on the an essentially negative understanding of the process of identity formation or subjectification, this paper assume the McNay's perspective focused on narrative identity (Ricoeur 1991) as a perspective capable of providing a framework in which coherent notions of self-hood are maintained, both on an individual and collective level, that a more substantive account of agency emerges (McNay, 1999). This framework allows to understand how men and women negotiate the processes of gender restructuring: in this perspective narrative has ontological status as "the fundamental mode through which the temporality of being is experienced, narrative simultaneously gives shape to identity and is the means through which selfhood is expressed" (Ibidem, p.317).

Following this perspective, the study employed a relatively recent framework designed to address these dynamics focusing on the negotiation of personal and master narratives (McLean and Syed, 2015). In this framework master narratives become the prescriptions, the types and ordering of events that should be present in one's identity narrative (McLean and Syed, 2015; McLean, Shucard and Syed, 2017), and individuals must negotiate their personal narratives within these cultural expectations.

2. Background and rationale

The cultural and educational studies that deconstructed the deterministic paradigm – inherent to the deficit model – explain the poor presence of women in research and academia as the result of a loss of interest by women in these fields of study (Wajcman, 1991)[1]. The relevance of social and cultural factors becomes increasingly crucial (Halpern and Tan, 2001), as do the performance levels in high school mathematics, which act as a critical filter (this theory is known as the *critical filter hypothesis*) of the eligibility of women (and blacks) for undergraduate admissions, and effectively limits their opportunities in the world of work (Sells, 1980).

By analysing this gender-related filter, scholars focused on two main dimensions: the social construction of gender stereotyping in relation to science, and the gender socialization process as the main way in which these stereotypes are internalised by the subject and act as a compass in daily life and life choices.

First of all, scholars emphasised a kind of incompatibility between the social constructions of female abilities and aptitude, on the one hand, and science, on the other (Kahle et al., 1993; Epstein, 1998). The social construction of science placed the various disciplines within a *continuum* that went from the female to the male pole: biology and other life sciences at one end of the spectrum (female pole), and physics and engineering at the other end, identified as the male pole (Blickenstaff, 2005). The process of socialization of gender roles defined the "gender schema" (Bem, 1981) as a compass with which everyone directs his/her choices, both by building self-confidence, by motivating and by defining the perception of one's own and others' aptitude (Sonnert and Holton, 1995)[2].

The main agencies of socialization (family, peer groups, schools and the media), by encouraging individual behaviours, attitudes, and personality coherent with social expectations, tend to reinforce each other in the construction of gender schema. Parents support behaviours and experiences consistent with gender stereotypes, by encouraging boys more than girls to engage in maths and science, as well as sports (Jacobs and Eccles, 1992). In this way, they are defining a lack of socialization of technical experiences among girls and an equally significant deficit in the life sciences among boys (Eccles et al., 1983, Osborn et al., 2000). Recent studies have focused on the importance of parents as role models, considering how they provide children with crucial information and feedback on educational, academic, and career options available to them and on the gender appropriateness of these options. In particular, Jacobs, Chinn and Bleeker show that parents' gender-typed occupational expectations are significantly related to their children's expectations at age 15 and to their children's actual career choices as adults (2006).

This socialization process is reinforced during the secondary socialization process, in which teachers' behaviours influence the self-perception of boys and girls about their abilities and skills (Steele, 1997). Recent studies have also shown how the lower scores of girls in mathematics can be traced back to different teaching methods. This includes the less

[1] At the same time, many scholars highlight certain relevant problems, at methodological level, in the empirical data used to support this theory (the most recent studies in this direction include Spelke, 2005 and Hyde, 2006).

[2] The concept of gender schema was used as a cognitive structure stored in memory that organized gender-related knowledge, beliefs, attitudes, and preferences (Liben and Signorella, 1993).

encouraging and more delegitimizing ways that teachers of both sexes use to address girls in a science class (Steele et al., 2007), and the teaching methods adopted for the sciences. Competitive teaching methods tend to favour the perception of science as a male field (Peterson and Fennema 1985; Niederle and Vesterlund, 2010).

Through the internalizing of gender identity, on the one hand, and the transmission of gender roles, on the other, boys and girls define different expectations regarding the roles that they can / will play in the future. Their choices start to diverge when they define their personal aspirations, which are inextricably linked to their education choices (*social cognitive theory*; Eccles 1994). There is a close correlation between their "choices" at educational and career level and their perception of their abilities and aptitude. Some studies have shown that boys tend to orient their educational and professional careers towards the sciences, mathematics and engineering, based on their perceived skills in these subjects, which are often overestimated (Correll, 2001).

With regard to the role of peer groups, these seem to be more relevant for girls. Young women are more sensitive to the degree of acceptance by their social group and the need to be recognised. Therefore, in some cases, women adopt camouflage strategies to disguise their talents and to be accepted by the group(s) (Kerr 1994, 2000). Scholars have shown how boys and girls use their peers to evaluate their own achievements and occupational aspirations and that their peers reinforce gender stereotypical behaviour and punish non-conformity (Hannover and Kessels, 2004; Kessels, 2005; Young et al., 1999).

Based on the abovementioned social cognitive theory, recent studies reveal how boys and girls attribute their success or failure in mathematics to diverse sources. Girls tend to attribute their success in mathematics, physics and science in general, to external factors, i.e. study time, luck or support. Conversely, boys tend to attribute their success in mathematics and related subjects to internal factors, such as talent (Britner, 2008).

In this process, the media play a crucial role in defining the perception and self-perception of appropriateness or non-appropriateness related to gender (Maccoby and Wilson, 1957; Reeves and Miller 1978; Calvert et al., 2003). By analysing the cultural matrix used by adolescents as a compass for their educational choices, scholars have identified the role played by the image of scientists, which has proven to be extremely stereotyped and with a high degree of resistance to change, given that its fundamental features tend to last in time and in space (Mead and Metraux, 1957; Schibeci and Sorensen, 1983; Fort and Varney, 1989; Finson, 2002; Makarova, Herzog 2015; Reznik et al., 2017).

It has been highlighted that, beyond the evident gender connotation of the drawings collected over time[3], the eccentric and antisocial characterization of the "mad" scientist represents an important obstacle to female identification and the possibility of girls perceiving a scientific career as a possibility for personal fulfilment (Eccles, 2006).

The literature on the process of socialization of gender roles and science has focused on the role models of female scientists in the Western media. While male scientists dominate the scene and

[3] Because of the difficulties encountered when writing for younger students, Chambers developed a methodology that become more and more popular, known as the "Draw A Scientist Test" (DAST; Chambers 1983), which requires children to draw a scientist, freehand, without receiving any further details.

media programming (Signorielli 1993; Steinke and Long, 1996; Long, Boiarsky and Thayer, 2001), women scientists, when present, tend to be represented in a stereotypical way, thus reinforcing the idea of an incompatibility between the two roles. They do this by underlining the subordinate position or youthfulness and attractiveness of female scientists (Weingart et al., 2003), thus reinforcing the stereotype of poorer skills (LaFollette 1981, 1988; Steinke and Long, 1996), or by focusing on the difficulty of striking a work-life balance (LaFollette, 1988; Miller et al., 2006), thus alluding to the incompatibility between the two roles (Steinke, 2005).

Recent research also confirms that the ghettoization of science still exists: examining the beliefs, expectations, attitudes and images of young adolescents regarding academic careers in science and scientific work clearly shows the persistence of gender differences. The imagination of girls focuses on developing medicines and finding cures for cancer, whilst boys' imaginations run wild with the idea of building machines, rockets and inventions (Jenkis and Pell, 2006; Rommes et al., 2010; Chrisridou, 2011).

What still needs to be explained is why and how alternative identities and abilities are possible, considering that some women have successfully pursued an education and career in mathematics and engineering. Such an approach allows researchers to consider identity as a broad concept, in which ethnicity, class, gender, language, lifestyle, and religion interact to create the experience of an individual and his / her self-perception. Thus, according to this framework, "identity formation" is essential to learning.

How and why students learn science relates to who they are and who they become in their lives and communities inside and outside of the classroom and whether or not they see their identities coinciding with the communities of practice that engage in science (Brotman and Moore, 2008). Thus, Brickhouse et al. (2000) argued that to understand why girls are or are not failing science in school, it is necessary to "know more than [the fact] that they are girls", and instead "know what kind of girls they are" (p. 457).

This is the reason why this study adopts a qualitative approach by analysing the self-perception of women who are successful in science, not only as university students but also in their careers.

3. Method

This study was conducted as part of the research in the framework of the TRIGGER Project[4], at the University of Pisa (Italy)[5]. A case study research method (including an analysis of secondary data on careers, a documental analysis, a survey and semi-structured interviews) was used by the TRIGGER team to study the six target departments during the four years of the Project. A complete analysis was not practicable, and selectivity was necessary. During this study, the issue of gender identity and scientist identity became more and more crucial, in particular in those women who succeeded in the sciences. This is the reason why this paper focuses on storytelling, the life histories collected from female professors in the Engineering Faculty or teaching a scientific discipline.

[4] The TRIGGER Project (TRansforming Institutions by Gendering contents and Gaining Equality in Research) was financed by the European Commission for the period 2014–2017, as part of the 7th Framework Programme. See: http://triggerproject.eu/.

[5] The proportion of women in academic positions at the University of Pisa, in reference to field (horizontal) segregation and vertical segregation is within the national average (Biancheri and Tomio, 2015; Frattini and Rossi, 2012).

Semi-structured interviews were carried out with 14 women scientists working in the Engineering Faculty, four out of five Full Professors (Grade A) and 8 out of 14 Associate Professors (Grade B). A semi-interview outline was used to guide the conversation on the sensitive topics identified in the reference literature (*etic* approach; Pike 1967) and to focus on the socialization process, on the self-perception of gender and scientist identity.

Even if the interviews were recorded (in order to transcribe them in full), we also took notes to keep track of non-verbal elements (to be used as a supplement for the reading of the full transcripts). During the transcription and analysis process, the interviews were numbered in ascending order, in order to keep track of the grade, but still respect the interviewees' anonymity.

In line with this approach, the analysis of the transcripts focused on the content of the interviewees' discourse regarding each item. This analysis was performed with the use of the Qualitative Data Analysis Software, NVivo. Transcripts were initially broadly coded according to each of the main discussion topic areas (e.g. "subjective task values", "role models", "views of scientists") and the content of these was then sub-coded thematically (iteratively testing out emergent themes across the data set to establish "strength" and prevalence). These coded themes were then subjected to a more theoretically informed analysis to unpick the constructive elements (and the gender schema) within respondents' talk.

A complete analysis of all interviews was not practicable, and selectivity was necessary. For the purposes of this study, the focus will be the self-perceived gendered beings and scientist identity as expressed by the interviewees. The results are presented by including an explicit indication of the coding referred to each interview, the grade (A for full professors or B for associate professors) of the interviewee and the frequency of the recurrent.

4. Findings

Subjective task values

Under the major theme of "subjective task values", the discourses of the interviewees confirm the crucial role of perceived self-efficacy in science and mathematics. Self-concept is based largely on our perceptions – whether accurate or not – of who we are in the eyes of those whose opinions matter to us. This topic is strictly connected with beliefs, attitudes and role models, such as parents, teachers, with some differences between female engineers and female physicians.

Most of the interviewees from the first group defined their relationship with science as easy and natural, in which primary socialization within the family and secondary socialization at school reinforced their self-perception. They described a socialization process in which the traditional and stereotypical attribution does not apply to their personal experience. In some cases, they *did* science at home; they "played" with science from the very beginning, thanks to their parents who were working in the same field.

> *(…) passion, yes… but always in the field of mathematics, because both my parents came from the world of maths… I was very good at maths, so it was something that excited me… (…) he [Editor's note: my father] used to say that when I was young, I couldn't understand what work he did and that he would tell me that he studied mathematical*

formulas and I really liked that, because it was easier for me to study these kinds of subjects than others, so it was a natural thing… but I didn't have a specific dream about a specific field… it definitely had to include scientific subjects, it had to include technology (COD_03; Grade B).

(...) and then from my mother's side, who comes from a large family: there are two civil engineers, an electrical-technical engineer and a high school maths teacher. One of the civil engineers was a university professor, he is retired now, but when I lived in Lecce, I would visit him often, given that we're also a very close-knit family. He travelled a lot, I found him fascinating and he was an inspiration for me when it came to choosing a career. And from my father, I got my love for the sciences. (COD_11; Grade B).

The key role of such primary socialization becomes more and more evident when considering the educational and career paths of the brothers and sisters of our interviewees:

Yes, other than the fact that all my sisters attended a secondary school with a scientific orientation… we all attended high school… we really… just think, I have 3 sisters… two graduated in mathematics, one in chemistry and I am an engineer, so let's just say that it was really… (COD_13; Grade B).

I have a younger brother and sister who, like me, attended a secondary school with a scientific orientation. Both of them graduated in engineering, here in Pisa, like me. My brother is a university professor in Paris and my sister is a post-doc fellow in Geneva (COD_11; Grade B).

The socialization process becomes relevant not only when strictly connected with science, but also when defining genderless specialization in play, within groups of peers, characterized by rather symmetrical patterns. Girls and boys can play the same games, often outdoors, and girls can even be involved in more structured games (e.g. football) that break down the classic assignment of roles.

We played a lot of role-playing games, our family was large, I had a lot of cousins… we didn't have any toys, but we played outside, in the garden… we loved to explore or to hunt animals (…) we skipped rope, we played hopscotch… we all played together, no one was left out… (COD_01; Grade B).

I played with the boys, but I didn't have the same physical strength as them and I would get injured. I stopped, because my knees were messed up (COD_13; Grade B).

In the storytelling collected, secondary education, their interaction with teachers, confirmed the interviewees' self-confidence and self-perception, which built up their image of self-adequacy in science. It was a progressive accumulation of self-confidence in their abilities and in their attitudes to science:

In my mind, I'm always been good at science, maths and so on ... always (COD_02; Grade A).

I've always succeeded in science (COD_06; Grade B).

About maths? ... For as long as I can remember, maths has been my best friend (COD_08; Grade A).

At secondary school, I had a great teacher who made science interesting and easy to understand (COD_10; Grade B).

Yes, my high school maths teacher, who was very good at communicating his love for mathematics and for the sciences (...). At school, I was very good at chemistry, so I went for chemical engineering (COD_11; Grade B).

I was gifted in scientific subjects. It was a natural choice (COD_15; Grade A).

This atypical process of socialization tends to transmit norms and values that are traditionally associated with the "male" domain, such as job orientation. If some scholars have shown a fork in the educational path between women and men based on the dichotomy between expressive-orientation and job-orientation, the storytelling underlines a strategic approach adopted by women when choosing a university course.

I was a bit unsure about studying the sciences, so mathematics and physics or engineering; I had chosen a field, but I wasn't sure. I chose engineering for work reasons, because I knew that with maths and physics I would have ended up teaching in a middle school or in a high school and that's not the job I wanted to do. So I preferred a faculty that would allow me to do a pleasant job within a company. (COD_13; Grade B).

The last extract cited below reveals another typical element of male socialization that is quite common in the life histories of women engineers (8 out of 15), namely choosing a degree (within the area of interest).

Role Models

The analysis of the interviews determined the relevance of gender role models within the family (there is still a correlation between gender roles and models), the construction of social/professional roles/identity and family expectations.

Gendered patterns also matter. It is evident that the socialization process tends to construct alternative beliefs to counter hegemonic beliefs regarding gender roles and attitudes both within dual-earner families and without. The relationship with the mother becomes a crucial means for self-definition, for identification rather than contraposition (oriented towards a choice that reflects the mother herself).

A mother who works, and who considers her work not only as a duty but also as an important way of self-realization, is a positive example of a mother and a worker. Regarding the issue of work-life balance there are virtuous dynamics at play: the social construction of gender roles (and class) meant that in these types of families there were paid staff dedicated to doing some of the household duties, thereby separating the role of mother from housewife. The following interviewee talks about how her mother chose not to work after the birth of her children, but still needed help at home (before hiring someone to help and then asking the grandparents for help):

She had help for a few years when I was young, then for a few years we had no one to help around the house, but then both sets of grandparents came to live with us (...) And so, my paternal grandmother would help my mom with the housework and with us children (COD_06; Grade B).

In the other cases, when the mother did not work, being a housewife was perceived to be a *deminutio*. These mothers complained of not being able to follow their own dreams and put

pressure on their daughters not to forsake their professional goals (cfr. COD_15; Grade A). In this case, the mother pushed her daughter to put her skills to good use, which her daughter did (she is now a Full Professor).

In other cases, where the mother was not a strong female role model, there were other relatives who filled this role: grandmothers, aunts, etc. who proved that it was possible to choose alternative routes in life:

> *And so I was an orphan with a mom who was a housewife. But there was a strong tradition of powerful women in our house: my grandmother was a teacher, my great aunt, who lived with us, was the head pharmacist at the Hospital of XXXXX and one of the first women graduates in chemistry in Italy, since she was born in 1901. So I breathed an air of culture and studying and female inclusion. And I have them to thank, these strong women. Back then, it wasn't easy to pursue a career… indeed, my aunt never married. And I was never discriminated against, not even in favour of my brother (COD_05, Grade A)*

The life paths of these women were characterised by the presence of role models with a powerful image of adequacy in terms of the role, skills and ability of women in science: for example, a mother who studied and taught maths (COD_03; Grade B) or a great aunt who was one of the first women graduates in chemistry in Italy (COD_05, Grade A). Storytelling tends to show how alternative beliefs for women are possible, but it is crucial to underline how those alternative beliefs are defined in a context in which the social construction and stereotyping of gender attitudes and gender roles are given and defined. These are stories of valiant and unique women who are within the reach of other extraordinary women.

On stereotyping

This kind of socialization process and the presence of such different gender role models have established a peculiar way for them to be a woman, to challenge social constructions. Their successful socialization in a scientific domain that is traditionally associated with a male pole seems to be reinforced in the storytelling by a close relationship with the same pole in other domains too, such as how to dress or play. They often emphasize in their narratives that they are a bit of a tomboy (almost wanting to reiterate their proximity to the male universe, which allows them to develop other male characteristics, such as an aptitude for science and technical subjects), as if they want to highlight their idiosyncrasies, which are suited to challenging stereotypes and prejudices, as illustrated by the following comment:

> *My mom would stress me out a lot, because of the way I dressed and because of the way I acted, because I always felt, not from a sexual point of view, but in terms of my role, that I was more boyish than girly (COD_13; Grade B).*

The traditional construction of gender roles and attitudes has been perceived and defined as a different, possible "solution", solutions that in some case lead women to envy men:

> *At the age of four or five, I was angry, because I wanted to be a man (COD_05, Grade A)*

A cross-reading of the storytelling collected allows this researcher to identify different attempts to negotiate between one's own aspirations and the stereotypical construction of gender roles. For example, legitimizing the possibility of being a woman in science as a comprehensive and all-encompassing role.

The perception of the inconsistency of female identity and scientist identity leads to the choice, even unconsciously, to be a woman (and a mother) and to be a scientist. In this way, however, the way to be a woman of science emphasizes the impossibility of fully and contextually covering all the roles associated with being a woman, in line with the dominant representations.

> *I always wanted to be a physicist… (…) I realised it when I was 14/15 years old (…) I saw myself becoming an astronaut, an astrophysicist… the stars. (…) I never thought about having a family… no, not really, actually, I even remember not wanting any children (COD_01; Grade B).*

Even if the process of socialization produces a gender connotation for university degrees or for a profession, the women interviewed were able to take on the challenge of demonstrating that this construction was wrong, thanks to the skills they knew they had. There is a desire to challenge, knowing that their skills will guarantee a successful outcome. Challenging a field perceived as "masculine" and winning can be very difficult.

> *I was planning on going to university, so I chose to attend a lyceum. I never even considered a high school specialising in the humanities, because I was better at the sciences than literary subjects. When I finished high school, I was looking for a scientific and masculine faculty. I was thinking of studying mathematics, but in the end I realised I didn't like it (COD_11; Grade B).*

> *[. . .] I chose engineering, because it was a very masculine profession, and I liked the idea of doing something that, back then, only 99 percent of men were doing (COD_13; Grade B).*

5. Discussion and Conclusion

This article has aimed to take the gender and science education literature a step further by relating the discourses and practices of science education to the production of individual scientist identities.

The storytelling collected identified how each of these women have defined a coherent identity that overcomes existing hegemonic beliefs regarding gender roles and attitudes, which form the basis of women's choices in terms of educational fields and career paths (particularly among the engineers interviewed). In terms of gender-based attitudes, and in particular reference to scientific and technical skills, parents and teachers seem to bear the most weight when it comes to the interviewees' self-confidence. These alternative beliefs, which are related to gender roles and gender-based attitudes, are defined during the primary socialization process, reinforced in the secondary and accompanied by the presence of role models that confirm such alternative models.

The paper discusses the complex process of developing a coherent sense of the self as someone who *does* science when who does science is a female, engaged in a very "masculine" field of science, such as engineering. Furthermore, it highlights the ways in which the perspective adopted adds a new kind of complexity to thinking about issues of gender and science.

The findings evidence how women who are perceived as having a "natural" aptitude for science, need to see their own multifaceted identities coinciding with the pursuit of science or as compatible with the social construction of science and scientific identities. This leads to the construction of a personal identity that seems to be separated from that of most females, in

terms of attitude, but also in terms of personal choice (being or not being a mother seems to be perceived as a crucial point in order to define a personal identity compatible with scientist identity) or perceived gender identity. The women involved in this pilot study defined a personal gender identity that defied the typical notions of femininity.

The women interviewed emphasised how they were attracted to the very aspects of science typically associated with masculinity and men, and that they pursued science because of these aspects, not in spite of them. At the same time, however, the master narrative around the division of areas of gender-related fields, attitudes, etc. emerge in the narrative identities collected. In many cases we found a complex relation between socialization messages about gender roles/models/attitudes and master narratives about gender and science, that result in narrative identity which emphasizes a tomboy self-representation, that is an alternative way to interiorize the traditional construction of gender attitudes in science. We have to consider carefully this process in particular for policies that aim to offer a counternarrative on gender and science by using "female scientists" as ambassadors.

This is the crucial point of the study: overcoming what was called the "paradigm shift" in research on gender and science (Gilbert and Calvert 2003), which offers an interpretation based on the stereotypical social construction of masculinity and femininity as mutually exclusive and associated exclusively with either males or females. Conversely, the research has to focus on the negotiation of personal and master narratives and *viceversa*, taking into account the influence of this process at macro level and the uneven and non-synchronous nature of change within gender representations.

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