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5. Mentorship - importance, forms and gender dimension

Introduction

While talking about important figures for their career developments, some of the physicists mention “private mentors” - teachers, parents or kin, who strongly influenced their life choices, especially in childhood and young age periods. This informal support has at least two different meanings. The first one shows an importance of having a role model to pursue an individual career, and to develop competences, knowledge and skills.

- *My parents and two extremely good teachers that cultivate my skills*// [were very important in my career development]. //82_M
- //One important factor [for the fact that I became a physicist] was my uncle who was a physicist, and he was much appreciated, he travelled around the world, he surfed, well, he was a very cool person, who was always around, he was my kin I mean, and he was a positive example of such career, he was very interested in physics. // 62_M

The second understanding of “personal mentors” sheds some light on significance of the support provided by close family members. The GENERA study reveals that encouragement for choosing a scientific career and approval of individual choices, expressed by “significant others” may play a crucial or at least relevant role in aspiring to become a scientist.

- //Beside my husband, no one had a big influence in my career. //76_F
- //My father was a key figure in this choice, he always supported me in choosing science career. // 41_F

Underlying the importance of the private sources of support is sometimes accompanied with demonstrating a lack of professional mentoring or assistance in pursuing one's career. In such narratives scientific achievements are presented as a result of individual efforts and hard work, and rarely related to a team exertion. In this context, physicists often indicate that they are more likely to consult important decisions about their scientific career with close relatives, kin or friends rather than with a supervisor. This may be due to the lack of certain institutional solutions that would enable creating of a space for such discussions and guiding in the workplace. But for some of them it was their sense of independence and autonomy that guided them through the course of their careers - few interviewees explicitly demonstrated a lack of interest in being mentored by somebody else.

- *No, quite the opposite. Everything I have done so far is my own doing, except for the mutual support between my wife and I.* 52_M
- //No, actually not. It is always an interaction between different people. So, I wouldn´t say that there has been a specific person. So, during our experiments, during my master thesis, of

course I had my boss whom I could always ask questions like how things work and what to do next. And I found him… So, he is a choleric person and strenuous but if you needed help, experimental, he really helped you very fast and good. (…) I believe he tried to support me but somehow (…) yes, experimental, when it had something to do with work then he could support me very much but with other decisions. I believe I mostly decided for myself. There I have consulted myself rather with my boyfriend. //22_F

- *I have always been quite independent, I have never had a reference boss. During my PhD I had two professors which led me and with whom I have continued working //*together years later. They were the responsible of the funds that's why they were our bosses. But there was not a baron who told you what you had to do and what not. Never was it a woman.// 39_F

Sometimes while being asked about role models or important figures for their career, physicists draw our attention to more abstract vision of a role model and stress their idealistic vision of what they want to achieve. For example, the idea of “changing the world”, a certain “curiosity”, knowing that “we still search for something, (…) that there are still great things to be done” were mentioned by some of the participants at the first place while answering the question about role models guiding their research and academic career.

- //I didn't have any role model in my career, I just followed what I wanted to became. //43_F
- *When I was young, I wanted to change the world by being a scientist.* 42_M

Furthermore, it's worth noting that a significant role of school socialization to science seems to be of high relevance to individual choices regarding future careers. For some of the research participants, their teachers from primary or secondary schools were the first ones who inspired them to follow the scientific path[1)].

- *And when I went to middle school (…) I participated in a competition in mathematics and physics, I had a lot of support, as I went to private school, we were a small class (18 people), and there was this physics club for pupils and it initiated my involvement in science. Then I went to public high school and I had a great mathematician but a bad teacher in physics, but despite that I was following physics path.* 62_M
- //When I was in high school, I went like one week to this academic discovery program. People from different schools and universities. I choose the physics course, but the course was not only the teacher teaching, he told us “Ok we have a problem to solve, you're in a room full of books and instruments, how do you want to work?” It made me really happy because I was afraid it could be very boring, but finally it really makes me have the decision to go on in physics. That man was not the most brilliant physicist of the world, but he convinced me it was the job I wanted to do. //37_F
- //Math teacher was from Moon, a lady who came to us only for a year, in 4th year of elementary school and she did such a revolution that I felt in love with math (…). And later I found myself in this fantastic class and at the beginning it was math and nobody told me that I am a girl and couldn't make it, and later [it was] physics and this teacher who told us that we could make it (…). //56_F

The research shows as well in what way more institutionalized and professional forms of support, mentorship and guidance impact individual careers in physics. The following part of the report gives center stage to definitions of the mentorship and its importance for the career development. It also discusses the main forms of scientific guidance and gender dimensions of being a female supervisor or leader, and managing male or female young scholars.

Importance and forms of mentorship

In addition to the above-described narratives focused on an individualistic description of own achievements, the majority of the research participants indicate that mentoring has a great significance for the scientific development. This attitude is rooted in the experiences of being both a mentee guided by more experienced scholars and a mentor to younger physicists. Many of the respondents demonstrate an **instrumental character of mentorship** by showing that having a good, well-organized, well-known and well networked supervisor is a key to the scientific world. In such perspective a mentor plays a role of a gatekeeper and a necessary link between his or her mentees and academic labour market, cooperation proposals, and grant programs. A supervisor in these descriptions ensures funds for the team research, helps his or her younger colleagues to apply for a job position, builds wide networks between researchers and includes to them those who are mentored. In this perspective mentors are the gateway to the academic success.

- *I think thesis supervisors are important; not only in terms of good or bad thesis supervision, but also professional contacts and research subfield.* 31_F
- *She was the boss of my research team and she encouraged me to apply for a prestigious post-doc grant. I am very grateful.* 26_F
- *Besides the fact he [his mentor] is recognized in science, and he has a lot of contacts, which I made a use of, he is also a smart and funny person.* 62_M

More specifically, the instrumental aspects of mentorship are sometimes narrowed down primarily to **help in finding a job** by young researchers. The research shows that informal support by giving a positive opinion or a recommendation about a candidate is often crucial for the employment process of a given person.

- *Yes, definitively. Definitively. Because if no one continues to support someone it is in turn difficult to find a new position, because there are many good people and it is not enough to do good work. There needs to be someone too who, so to speak, would vouch for someone or tell someone "I know someone, who I would advise you to hire them."* 09_M

This facet of the mentorship is also visible in some stories told by physicists who did not experience such support and who compare their situation with colleagues having this kind of backing in their professional life. Such observation of different mentors' attitudes, resources and various levels of their involvement may lead to a growing feeling of dissatisfaction and injustice experienced in the academic world.

- *Yes, you really have to... if you have a boss who is a well-known and well-organized person, well, [then] these young people [under their supervision] get grants, yes, you see, they develop very nicely, get promoted, and I am happy [for them. On the one hand, I am sorry that I do not have such a possibility, I have to build my own position, which probably will take me more years, but I think that in time I will get some research funds and then I will really spread my wings.* 65_F

Apart from this instrumental dimension of mentoring, a lot of space in the interviews was also devoted to the **substantive aspect of scientific cooperation with supervisors**. It is worth noting that a mentor often performs **a variety of roles**, providing younger researchers with not only strictly scientific skills, but also organizational, social or related to public speeches. Such a broad definition of mentoring translates, in turn, into strategies of using it. This means that young researchers derive diversified skills from their tutors.

- *I always had such an attitude that I tried to pull out some positive things [from cooperation with each supervisor], so as to learn as much as possible, and each of them //*had certain skills, from a certain area. One was, let's say, a good organizer, I do not know, the other was better in science. You could rely on their approaches to certain issues, so I tried to take these positive things into account and take advantage of them, (…) so that I tried to follow good things, and leave the rest [of them] somewhere to the side, so this is a question …, so each of these people would be, as I say, important, each significantly influenced me, because I learned from each important things so I cannot say that … I mean I liked some of them less or more, but I took something from each one, whether it some skill or a certain philosophy. //68_M_L

- *These gentlemen had a huge impact on the fact that I was never coerced into anything, I was not told that I could not do another step because a certain experiment or development path was planned. On the contrary, I was encouraged to try using all the weirdest ideas. And that resulted in the fact that I was firstly in this group of the Nobel Prize winner and then I was in Xxx [name of the country].* 58_F_L

The cooperation between a mentor and a mentee influences sometimes explicitly career decisions of young researchers, when for example they decide to follow their supervisors and move from one research center to another, also to a foreign country like in the quotation below.

- *[Going back to home country] was basically only a coincidence. So I didn't make the conscious decision. It was the case that I worked for the director Xx, who used to work at the University and I was there with her as a post-doc and then she was appointed as a director and then I just followed.* 08_F

This different dimensions of the mentorship' significance is from time to time accompanied with more specific expectations addressed towards scientific guides. In Polish context for example in two different institutions an additional character of mentorship, related to the **personality of mentors**, was underscored. In such understanding a mentor is not only responsible for scientific development of his or her mentees, but introduces them to broader social and cultural worlds, by showing e.g. how to behave or act in a cultural and ethical ways. Such vision of mentors was also expressed in French realm. The perception of mentors through the prism of their outstanding personality was present above all among senior researchers.

- *Undoubtedly, when I came to this institute, professor [name] was such an authority in a scientific sense, but also in [the other sense] … He was not, after all, old … With some sadness I have to say that this group of professors, who were the most outstanding group in our institute, at the moment, mostly do not work. There is the next generation now, and the older group, not in scientific terms, but in terms of behavior, representation, acting, I think was "better", and undoubtedly, this professor [name] was such a personality. We did not always agree (…) there were some disagreements, but it's normal for people to happen, but for me he was somebody important and different, different from among all the others and that's why I ask myself whether there is such a person in our work environment right now*. 70_F

- *It means that these are the people who influence other through their behavior, often ethical behavior and such people used to be and still are here (…) and this is very important that there are such people not only for me, but they had an impact also on colleagues.* 54_M_L

- //So, they are this kind of academic people of very high level, with a personality very highlighting for their colleagues. I mean, you can be very clever and specialized in your domain but be totally stupid in real life, I consider it's not an intelligent person. This people had the whole package, they were really a source of inspiration. //35_M

Mentoring in the collected narratives was often equated with formal and informal supervising, informal and personal support or even support received through collaboration in a team. For example, in some definitions given by the interviewees mentoring means simply **close and productive collaboration with a team**. In other interviews, the interlocutors expressed their appreciation of working with younger generation of physicists, who can provide new ideas, theories and tools to the research.

- *My team colleague is a role model to me. My team colleague is always encouraging my work in a very supportive way.* 83_F
- *I still have support from my mentor, he is almost retired but he still supports me. He tries to get grants for the team, teaches cooperation with other people, centers. This is important. As for strictly scientific support, I try to cooperate primarily with young people, because they have a more fresh perspective, they bring a new perspective. They come to me with questions, present their perspective, but I also often ask them about various things. I feel that there is a discussion between us, a live debate. And older employees are often discouraged.* 74_F

Such a perspective clearly shows that mentoring is still more often understood as informal support received from colleagues and supervisors. Institutionalized mentoring programs are rarely invoked.

Critical evaluations of mentorship

Although the majority of respondents positively commented on cooperation with mentors, there are also very critical evaluations regarding such cooperation and assistance received. A good illustration of such reflections could be the following statements: “it was a clinch in which I found myself for a very long time and which also caused a lot of burnout”, “I was left alone”, “I did not receive any support”. Among situations indicated as the reasons for difficulties in obtaining support appeared: distance mentoring, personality conflicts and conflicts in the team.

- *I had no mentors at Xxx [name of institution], at the contrary I must say I had there a mentor “at negative”, people that provide negative examples and I would not became as they are.* 42_M
- *As I was doing a PhD programme, I was writing my articles and I was very happy [at that time]. Unfortunately, the next two bosses, whom I chose, or maybe I had no other choice, claimed that in principle only they are able to write good articles. And this exhausted me.* 65_F
- *I had no mentor for my career.* 76_F

On the other hand, critical evaluations came from mentors as well. Some of them indicate several difficulties in supervising young scholars, showing e.g. that mentees should be “released” at some point of their career path to gain their independence, autonomy and capacity of making decision. Basically “giving somebody a free rain” is seen as something positive when it comes to guiding young scholars.

- *When it comes to my boss for instance - he is very self-reliable person and he was like that from the beginning. At some point this mentoring is very helpful and I try to introduce my students to the lab, show them what and how, so they don't feel like being on their own, but at some point they should be “released” and be taught some self-reliance in work. Mentoring yes but not introduced by force and not for too long - just like raising the children.* 55_F
- *I mean, I do not think I have a plan [regarding being a mentor] here, I do not know. Well, it*

depends of course on a person you cooperate with. In the case of my doctoral student, during the PhD program there were consultations, I suggested her what to do, now after the program [is finished] our cooperation is based on an idea she can do what she wants, but I clearly said to her that "if you want to consult something that is unclear, something to be explained, you can always come to me". Yes, I think that after the doctoral thesis, you have to give this independence too. 72_M

Gender dimensions

Female role models

While talking about gender dimensions of mentorship, physicists underline relatively **visible lack of female role models**. Some of them indicate that it's hard to find any contemporary famous female scientist with whom young researchers could identify. On the other hand, it was revealed that sometimes the scientific world does not provide positive examples of female reconciliation of professional and personal life **- a dominant discourse promotes a total devotion to science and does not advocate for more balanced vision of career path **(see also chapter "Career paths…).

- *When you think about it, the only female model people know in physics is Marie Curie. She died a very long time ago, of course she was brilliant but how do you want young women of today identify with her?* 34_F
- *There were not so many female role models which I met during my career.* 01_F
- //[Interviewer in referring to her current supervisor: Was it important for you to have such a role model, a female role model in physics so that you can see that it works?] Yes, of course. Yes. Whereas, that is always funny. There are many things that should work on paper, and then you don't find a woman in real life that embodies that. So I do not know a famous female physicist, for starters. And I do not know a female professor with kids. Full stop. And then you are always told 'Yes, of course you can have a career with children; that's all possible'. Yes, show me where. Go on. Please. And then you think to yourself, oh great that works. And either you try to be the first and then good luck to you or you say, yes, I am not going to do that to myself and you leave. //07_F
- *In my Institute there are a number of female researchers that I always considered as peers. No one on those was a role model or boss.* 41_F

In the context of role models, **the need to create (informal) support networks between women** is also pointed out, so that at different stages of their career they could exchange their experiences and feel comfortable in the workplace (see more in the section on networks).

- //The support measures are different at different stages, but it is essential that women support each other, for example in faculties, I do not see why it should be institutionalized, but I think we should have tutors for both women and men so that young people who go to college with any problems do not feel embarrassed or feel bad about trying to tell their problems. //58_F_L

Gender and leadership

One of the topics discussed during the interviews connecting gender dimensions and mentoring is related to differences between male and female bosses. Most of the interviewees **did not**

experience having a female boss during their entire career. A general belief that women in leading positions are evaluated differently than men is expressed by physicists.

- *I did not have so many, but a female boss suffers more negative judgments than a man.* 49_F

Those who had such experience underscore two important aspects related to female leadership. The first one indicates that there are in fact no differences between male and female leadership styles. In such perspective the attention is shifted to **individual personality rather than gender**.

- *My boss is a woman, [there] is no difference between a man and a woman in leading a group.* 75_F
- *No, I think there are differences, but they exist because everyone is a different personality, not because of sex. It is known that new authorities mean new directions, new way of thinking, this is natural, but I don't think it is related to being a male or a female.* 53_F_L

The second facet of female leadership reveals primarily positive evaluations of female leaders by describing their **constructive engagement in chief roles**. It is indicated that women contribute better than men to organizational aspects of work, that they are more “stable”, “empathetic”. Management style linked with female bosses is based on multitasking skills, good organization of time and stability.

- *I'd like to have a female boss, because I think women are more organized and more stable.* 83_F
- //A female boss seems to be a better administrator that gives a proper balance between personal life and profession. //82_M
- *Different leadership than men's meaning that women are more empathic and are good at group formations.* 32_F

But it's also worth noting that other studies on female leadership in academic world shows that female leaders not only meet with critical judgments from colleagues (both male and female), but also in some cases do not necessarily support each other. For example Redmond et al on the basis of literature review demonstrate that “emerging leaders regularly report having had negative experiences with female co-workers and supervisors within the workplace. In addition, senior women who have not had support from their female colleagues are frequently unaware of how best to support other women aspiring to assume leadership positions and often consider aspiring leaders as a threat to their own advancement”. **A lack of support from female leaders** is also experienced by some of the respondents, although it is **quite rare**.

- *Yes, I really appreciated the fact that she was a woman, because she was very reliable, although she said …because she was there to write an opinion about me, she told me //*that the opinion would be good, but she had two excellent (male) doctoral students to whom I did not hold a stick, she told me so. It was unpleasant at the end.// 64_F

In the realm of female leadership, it is also pointed out that the presence of women in the role of bosses may favor **the emergence of female researchers** in a given department. Presence of women in leading positions acts as encouragement for other female researchers to enter the scientific world.

- *No, but that is not the case with us at all. However, coincidentally we are three women and two men in this group. […] But we are the only women in the entire department too. But I think that*

this was a coincidence, because my supervisor is a women and then. 07_F

Supporting female and male young physicists

Another important topic discussed with the research participants covers a problem of the **intersection of gender and mentoring** - namely **supporting young female scholars**. The majority of the respondents did not participate in any formal and institutionalized mentoring programs for women in science. But the collected interviews reveal various aspects and ways of thinking about the need of supporting women in physics. The main noticeable experiences in this regard are:

__no experience in mentoring __

Some of the interviewees, both senior and young researchers have not been mentors due to the character of the work. The support they gave during the professional career is perceived through the prism of collaboration and team work.

- *I had no occasion to be a mentor.* 41_F

__gender neutral mentoring __

Not having any “special rules” regarding female mentees appears in the realm of gender neutral mentoring. Although the respondents mention working with and supporting younger researchers, they also underscore that they try to treat everybody in an equal way and support every talented person regardless their gender. Such attitudes are often accompanied with a critical assessment on the needs for special programs addressed to female scholars.

- *I prefer to judge not on whether female or male but on what they are worth. I prefer not to promote one or the other gender.* 05_F
- //If someone wanted to meet me more often and came to me and said that he wanted to talk to me, of course I would do it, but I do not recall the situation to do it on special rules, except when I was in a scientific center where my female PhD student also worked, then self-evidently we met more often and talked more. //58_F_L
- *I don't see any differences between men and women because it's all about science, and not about being a male or female. If you work hard, you can achieve something [in academia] regardless your sex. I believe in a human mind.* 63_F
- //But when they are in the team, they are all treated equally: I support the students, I give them missions, I encourage them to speak publicly, for both, women and men. //34_F

__informal mentoring for female physicists __

The most common model of mentoring present in the narratives involves **building an informal network of support** between more experienced researchers and younger colleagues and students.

- *Of course there are a couple of students, which I support, but like not in this direct mentor - mentee relation* 14_F

In this approach mentoring often goes beyond clearly scientific collaboration and enables female scientists to share with each other broad experiences and reflections. Such vision of mentoring programs is in compliance with a need for having role models who could be used as “real examples”

of how to reconcile professional work with personal and family life.

- *(...) not entirely, but for instance during my first post-doc, the university had a program, which was called “Women mentoring women”, where they connected post-docs to students and where you would then, so it was just informal, meet and, yes, talked about everything that was important at the time. So that was the one thing. And the other thing was only in projects in which you would work with students and needed to pay attention that they (laughs), yes, that they are students and not post-docs.* 08_F

The lack of defined rules with regard to informal mentoring may, however, lead to potential conflict situations or lack of recognition of the mentor's work.

- *[...] Two years later one lady appeared, also a MA student and situation was similar, meaning part of the research was designed for her MA research and it was tragic. (...) I have to say that I felt exploited, I wasn't her supervisor, I was helping her a lot with experimental work and thus with data analysis and later I devoted a lot of time, (....) and it was like that I was applying for additional scientific attractions, then we were going to do our research to synchrotron centres so I helped her to find funds so she could go with us and fully participate and when it came to process finalization and writing a thesis, I don't know how much I helped her, but I helped her with editing this MA thesis, she went with grudges to promoter [saying] that she actually complains about our collaboration because I never had time for her and [that] I didn't talk to her (...).*57_F

__mentoring addressed to students in high school __

Those physicists with teaching experience underline the importance of starting mentoring activities as early as possible in order to meet the needs of students and pupils.

- *Experience with the upper classes to inspire and mentor. It is fundamental that people are involved and aware. People aged 17 ask me how to manage to balance research and family.* 46_F

__differences between male and female mentees __

The majority of interviewees underline that they do not see any evident differences between male and female mentees and their needs. If they are any, it is related with **individual approach to science, personality and experiences**. Some of the mentors, however, indicate that girls are socialized in a different way than boys what may result in various styles and approaches towards career path. Female mentees are perceived as more conscientious, dutiful and well-organized than male.

- *Female PhD students are asked more to do things because they say yes where boys are more likely to say no. At some point I realized it.* 01_F
- *I would say that the girls are trying harder. Gentlemen are relaxed about everything. Usually girls, when there are some deadlines, they try to fit in these dates, they also try to work on better grades. Gentlemen are who they are and do not necessarily want to change, which sometimes is deplorable in its consequences.* 65_F

personal experience triggering a need for being a mentor

Becoming sensitive to gender-related issues in mentoring can be associated with own experience of discrimination and sexism. This applies to both women and men.

- *It's a personal experience, I don't know if it's useful for you. My wife is a physician; she has been treated very badly in her first hospital in Xxx [name of the country]. She was pregnant and when she announced that to her chief of service, he became crazy. He told her: "You fucked up all my planning. Go away, I don't want a dead weight in my team." This personal experience made me very sensitive to problems and what is more difficult for women. So yes, I helped a little bit more my female students than the guys.* 35_M

next

[1)]

Thus, gender equality plans for science should include actions addressed to both teachers and pupils with special attention given to girls.

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