

# Mathematician's Careers - Analysis of a Questionnaire

by Ina Kersten and Emilia Mezzetti

The main issue of the Committee for Women and Mathematics of EMS in the last two years has been to distribute in the European mathematical community a questionnaire on careers of mathematicians and to try and analyze it. The questionnaire (which follows) contains questions about progression in the career (age, age of Ph.D., age of first permanent position, number of temporary positions...), about family (job of parents and of partner, number of children,...), about scientific activity (age when wrote best paper, possible gaps in mathematical production and reasons for these gaps). Our aim was to check if it is true, and in what measure, that there are differences between CV's of men and women, and in particular if it is true that the scientific career of women is generally slower, mainly because of family duties, especially children. Were these hypotheses confirmed, we would have a basis to start some concrete action, for instance against age limits in announcements for grants and prizes, which seem to be particularly discriminating to women.

The questionnaire.

1. Are you male or female?
2. How old are you?
3. What is your nationality?
4. How many children do you have?
5. At what age did you complete your PhD?
6. How many countries have you studied/worked in?
7. What is your mother's job? What is your father's job?
8. Do you have a permanent job?
9. How many years after your PhD did you obtain your first permanent job?
10. How many temporary mathematical jobs have you had?
11. At what age did you write the paper of which you are most proud so far?
12. (a) Have you had any gaps in your mathematical career?  
(b) If so, how long were those gaps?  
(c) In your opinion, what were the reasons for those gaps?
13. Comments:

In some versions, the following questions were added:

- (i) What is your partner's job?
- (ii) Did you choose your place of residence motivated by your career or by that of your partner?
- (iii) Did the problem of the residence play a role in your professional life?

The questionnaire has been distributed during the 3rd European Congress in Mathematics in Barcelona and its satellite meeting “New women in mathematics”, published in the Newsletters of EMS and some other mathematical associations in Europe, and personally distributed by members of the committee. We have collected 109 answers, 52 by women and 57 by men: not a big number. This shows, in our opinion, that unfortunately mathematicians have no wish to fill out questionnaires, and are not really very interested in the problem.

Almost one half of the respondents (45 %) are from Norway: indeed the questionnaire has been distributed in a capillary way in Norwegian mathematical departments, and the answers collected by secretaries. So the picture of the situation in Norway is rather faithful.

Of the other respondents, 15 are German, 13 Italian, but other countries are still less represented. There are a few answers from Russia and Romania, but none from other East European countries. Here are some tables summarizing the answers.

<b>Nationality</b>	<b>Female</b>	<b>Male</b>	<b>Total</b>
British	2		2
French	5	1	6
German	11	4	15
Italian	11	2	13
Norwegian	8	41	49
Romanian	2		2
Russian	4	1	5
Spanish	2		2
USA		2	2
Other	7	6	13
<b>Grand Total</b>	<b>52</b>	<b>57</b>	<b>109</b>

<b>Age</b>	<b>26 - 29</b>	<b>30 - 39</b>	<b>40 - 49</b>	<b>50 - 59</b>	<b>60 - 66</b>
<b>Frequency</b>	5	34	42	18	10
Female	4	21	20	5	2
Male	1	13	22	13	8

<b>No. of Children</b>	<b>Female</b>	<b>Male</b>	<b>Total</b>
0	13	12	25
1	12	12	24
2	19	14	33
3	5	14	19
4	2	4	6
6		1	1

Age when Completed Ph.D. and when Wrote Best Paper

	<b>Respondents</b>	<b>Female</b>	<b>Male</b>
Mean Age	43.88	40.74	46.78
when Completed Ph.D.	29.29	29.16	29.38
when Wrote Best Paper	34.56	32.56	36.34

Age	when Completed Ph.D.	when Wrote Best Paper
22–23	—	Female: 2   Male: —
24–26	Female: 8   Male: 15	Female: 3   Male: 3
27–29	Female: 15   Male: 13	Female: 12   Male: 7
30–32	Female: 8   Male: 17	Female: 11   Male: 10
33–35	Female: 5   Male: 3	Female: 6   Male: 11
36–39	Female: —   Male: 5	Female: 5   Male: 8
40–42	Female: 1   Male: 1	Female: —   Male: 4
43–48	Female: 1   Male: —	Female: 5   Male: 5
52–56	—	Female: 1   Male: 4
62–63	—	Female: —   Male: 2
	<b>No Ph.D.</b>	<b>No Answer</b>
	Female: 14   Male: 3	Female: 5   Male: 3

Many respondents obtained a permanent job before completing their Ph.D.

At the average, the female respondents are 6 years younger than the male respondents. This obviously affects the answers when the best paper was written: female age 32 and male age 36. The mean age of Ph.D. is however the same for men and women.

### Gaps in Mathematical Career

46 Respondents (26 female and 20 male) said that they had gaps in their mathematical career.

**Frequency of reasons given by the respondents for gaps in their mathematical career:**

Reason	Female	Male	Total
Children/Family	18	3	21
Personal Problems	6	3	9
Administration/Managerial	3	2	5
Military Service	—	5	5
Teaching	2	1	3
Industry Job	1	2	3
No Progress on Difficult Problem (isolation)	2	1	3
Bad University Job Market	1	1	2
New Research Area	—	1	1
Writing Books	—	1	1
Other Interests	1	1	2
Career related stress	1	—	1

Number of Respondents having a Permanent Job: 87/109

**Female: 35/52, Male: 52/57**

*How many years after your Ph.D. did you obtain your first permanent job?*

Nationality	Gender	Permanent Job	Before Ph.D.	After Ph.D.
Australian	Male	0 / 1	–	–
Austrian	Female	1 / 1	before	–
Belgian	Male	1 / 1	–	$\leq 1$ year
British	Female	1 / 2	–	4 years
Bulgarian	Female	1 / 1	before	–
Canadian	Male	1 / 1	–	6 months
Croatian	Female	0 / 1	–	–
Dutch	Male	0 / 1	–	–
Finnish	Male	1 / 1	–	6 years
French	Female	4 / 5	7 years	0, 1 year
	Male	1 / 1	–	4 years
German	Female	3 / 12	immediately	2, 7 years
	Male	2 / 4	–	6, 11 years
Hungarian	Male	1 / 1	–	6 months
Italian	Female	9 / 11	6 $\times$ before	3, 4 years
	Male	2 / 2	2 $\times$ before	–
Japanese	Female	1 / 1	–	4 months
Maltese	Female	1 / 1	before	–
Norwegian	Female	8 / 8	–	1 – 5 years
	Male	40 / 41	17 $\times$ before	1 – 8 years
Portuguese	Female	1 / 1	–	5 years
Romanian	Female	2 / 2	before	1 year
Russian	Female	2 / 4	before	–
	Male	1 / 1	before	–
Spanish	Female	1 / 2	–	3 years
Swiss	Female	0 / 1	–	–
USA	Male	2 / 2	immediately	7 years
				<b>No Answer</b>
				F: 3, M: 1

The question of possible gaps in the mathematical career had rather surprising answers: more women than men had gaps, but the percentage is high also among men: 36%. For women the more frequent reason is family, but there are also academic duties or personal problems as depression or stress. Among men, all these reasons appear and moreover military service.

Answers to the question about job of partner and parents are rather interesting, but maybe not really related to our aim: the mother is often a housewife, the father an engineer, or a school or university professor, often in scientific topic.

### Partner job

33 respondents (26 female and 7 male)

Job	Female	Male	Total
Mathematician	9	-	9
Computer scientist	2	2	4
Professor	5	-	5
School teacher	5	4	9

### Parents job - Mother

<b>Job</b>	<b>Female</b>	<b>Male</b>	<b>Total</b>
Housewife	16	23	39
Clerk	8	3	10
School teacher	7	8	15
Secretary	2	8	10
Professor	2	-	2

### Parents job - Father

<b>Job</b>	<b>Female</b>	<b>Male</b>	<b>Total</b>
Engineer	9	8	17
School teacher	5	6	11
Professor(*)	7	6	12
Clerk	6	3	9

(\*) mathematician in several cases

Other questions, for example the one about number of temporary jobs, appear not relevant at all.

In conclusion, we have to admit that the sample we have collected is too small to allow us to draw any meaningful conclusion.

The results of this questionnaire have been illustrated during the 10<sup>th</sup> international meeting of European Women in Mathematics (EWM) (Malta, 24-30 August 2001), where several members of our committee were present.

An interesting and lively discussion followed. Particularly interesting was the contribution of Doris Janshen, a sociologist from the University of Essen. She gave us several suggestions. We should start again from the beginning, with a new well thought-out questionnaire, taking into account as a basis the results of the previous one. We should concentrate on a few countries only, and try and collect a representative sample, as in Norway last time. Before distributing the new questionnaire, we should make some samples, testing it on some selected EWM members, for example. This is what we plan to do.

For example, mathematicians of Eastern Europe did not show much interest in this kind of statistics, maybe because it is not difficult to obtain a permanent job after Ph.D. in these countries. A group in Ukraine, coordinated by Polina Agranovich, has prepared now another series of questions and is currently distributing it in two universities in Kharkov. It is mainly devoted to understanding reasons for choosing mathematics and possible gaps in the career.

To conclude, I want to quote three recent articles which are somehow related to our work.

The first one is a report, written by A. Abele, H. Neunzert, R. Tobies and J. Krüsken, about the interdisciplinary project entitled "Women in mathematics: factors determining mathematical careers from a gender comparative perspective" and supported by Volkswagen Foundation. The article appeared in the Newsletter of the German Mathematical Society, DMV-Mitteilungen, 2-2001, p.8-16. It has been recently translated into English and will appear in the Newsletter of EMS. It contains several very interesting data and an analysis of the development of the situation of women mathematicians in Germany. Among other things, it confirms the sometimes questioned fact that women and men have the same potential capability of doing research. Women who succeed in concluding Ph.D. studies in Germany obtain completely satisfactory results and get the same marks as their male fellows.

The second article is by Michèle Audin (Sur les étudiantes en mathématiques, Gazette des mathématiciens 87 (2001), p. 41 - 49, Newsletter of Société Mathématique de France). She analyzes the percentages of girls among first and second year students of mathematics in her

university in the 90's and compares the results of the exams. Then she concludes that girls choosing to study math are much more motivated than boys and get better results.

Once more this convinces us that a stronger female presence would be of great advantage to the mathematical community, that could enjoy of big unexploited potentialities.

The last one is a recent article by Reuben Hersh, published in *The Mathematical Intelligencer*: "Mathematical menopause, or, a young man's game?" (*Math. Intell.* 23, No.3, 52-60 (2001)). It deals with the theme of the presumed incapacity of doing research in mathematics after a certain age. On the basis of a research carried out among his friends and acquaintances (about 65), the Author concludes, among other things, that, if it is true that creativity decreases with age, it is replaced by experience and capacity of coordinating the work of other people. So it is possible to continue a good level scientific activity also after having crossed the famous threshold of 40 years, sometimes considered as a limit age.

A short report on this questionnaire program, by Ina Kersten and Emilia Mezzetti, will appear in the Proceedings of the EWM conference in Malta, to be published by World Scientific.

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