CERN/DG-11
8 March 1980

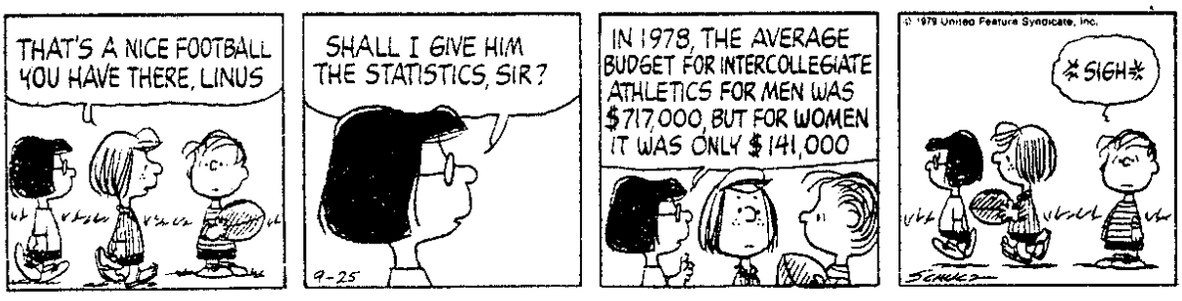
REPORT ON WOMEN IN SCIENTIFIC CAREERS AT CERN

Mary K. Gaillard

LAPP, Annecy, France
and
CERN, Geneva, Switzerland


IL Y'A UNE FEMME...
QUOI?
IL Y'A UNE FEMME À L'ACADÉMIE!
ELLE NE PEUT PAS ATTENDRE LA FIN DE LA SÉANCE POUR FAIRE LE MÉNAGE?
WOLINSKI

PEANUTS


THAT'S A NICE FOOTBALL YOU HAVE THERE, LINUS
SHALL I GIVE HIM THE STATISTICS, SIR?
9-25
IN 1978, THE AVERAGE BUDGET FOR INTERCOLLEGIATE ATHLETICS FOR MEN WAS $717,000, BUT FOR WOMEN IT WAS ONLY $141,000
© 1979 United Feature Syndicate, Inc.
SIGH

PREFACE

On two separate occasions during the academic year 1978-79, wives of CERN theory staff members applied for visitors' positions in Theory Division and were turned down in a way which suggested to them that their applications were handled in a different context from those of male applicants. These incidents provided the occasion for considerable discussion within Theory Division, and some of us who participated in the debate discerned a lack of sensitivity to, or ignorance of, the particular problems encountered by women who attempt to pursue a scientific career. This is the immediate reason for the present report.

While a single case history does not constitute a social problem, the yes-no answers which can form the basis of a statistical survey do not easily convey the subtle barriers which scientifically or technically minded women may encounter essentially from birth. In order to obtain as broad a base as possible for this report, we have sent questionnaires to all listed female CERN employees and visitors in Categories I (physics research) and II (machine physics, engineering, programming, health physics, and astronomy) as well as to a number of outside women who have had some contact with CERN. We obtained 62 replies, which form the basis for the first part of the report. In the second part we attempt to compile some of the less easily categorized remarks which were also solicited in order to better illustrate the more intangible difficulties.

There was considerable discussion among ourselves as to what form the survey should take. Our objectives were of necessity limited and were roughly as follows:

1) What is the status of female scientific personnel at CERN? What are the problems peculiar to CERN which may require special consideration? How does CERN compare with its member countries -- or with other countries, like the United States, where the question of feminism has taken on political dimensions which have resulted in tangible progress?

2) What are the more general factors which contribute to the fact that only small numbers of women are found in scientific professions? CERN is clearly not in a position to remedy educational and social biases throughout Europe. However, as an institution representative of European research, it should at least be made aware of them -- and, perhaps, of the necessity for compensating them to some extent. Young women participating, for example, in summer student programs might feel their options were wider if occasionally they found a woman in a position of scientific responsibility.

The above points are specific to women in technical professions. We are well aware that responsibility in administrative professions is not equitably shared among men and women according to their talents. However, a general feminist attack is beyond the scope of the present report, and we can only encourage a similar study addressed to women in administration. Nevertheless, many of us have husbands, companions, and children, and the status of working women in relation to their personal situations, which transcends the choice

of profession, cannot be ignored. Some respondents to the survey in fact felt that questions concerning domestic situations were misplaced, being personal and unrelated to professional concern. However, most men -- in technical professions or any other -- also have families; society traditionally demands that the woman, not the man, subjugate her professional aspirations to domestic necessity. We feel that a just society must necessarily take into account the full scope of intellectual, professional, emotional, and social aspects of human beings, be they male or female. Therefore the third point of our survey deals with the domestic situations of professional women.

Independently of the incidents mentioned above, a small group at CERN worked over a two-year period, without success, on a project for an all-day kindergarten. The response of the respondents to the present survey is overwhelmingly favourable to such a project. The appendix to the report summarizes the work of the CERN group and reports on analogous services elsewhere.

For more ambitious studies of the status of women in science, we refer the reader to articles by Josette Cachalou[1] on women in the French Centre National de la Recherche Scientifique and by Vera Kistiakowski[2] on American women in physics. Since Americans have consciously addressed themselves to this problem in recent years, and since France is generally regarded as being rather progressive with respect to professional women, we consider the negative tone of these authors' conclusions as indicative of the necessity of facing a problem which concerns half the population of every country.

Acknowledgements

This report would not have been possible without the critical comments and suggestions of many friends and colleagues, both during the formulation of the questionnaire and at the final writing. I am indebted to all the women who took the time to discuss, correspond, and respond to the questionnaire, particularly Aurore Savoy-Navarro and Anna Vayaki whose contributions are among those cited in Section 2, and to my colleagues in the CERN Theory Division for their encouragement.

The compilation of responses and the material preparation of the questionnaire and report were done with the collaboration of Bianca Conforto, Bruno Gaillard, Kathie Hardy, Ann Kernan, Kate Morgan, Sheila Navach, Anne-Marie Perrin, Nan Phinney, Hartmute Plothow, Christine Redman, Jacqueline Stern, and Pascal Wastiaux. We appreciate the co-operation of W. Blair and G.J. Bossen of the Personnel Division, who provided statistics on CERN personnel, Cynthia Reay and Janice Roberts of Fermilab for information on their day care project, and Franco Francia of the Staff Association and Suzy Vascotto of the CERN day-care working group for help in preparing the Appendix.

1. SURVEY OF CERN WOMEN IN PHYSICS RESEARCH AND RELATED CAREERS

1.1 Profile of the respondents

There are about 90 women at CERN in Category I (physics research) and 50 in Category II [including engineering, machine physics, health physics, programming, and astronomy (ESO)]. These women constitute about 5% of the scientific personnel. The numbers fluctuate frequently, but the statistics shown in Table 1, based on data provided in June of 1979 and February 1980, should be representative of the present situation. While the over-all percentage of women is low, the percentages of staff members and of fully paid personnel in each category is still lower.

Table 1

Statistics on scientific personnel at CERN

		Category I			Category II		
		Total	Female	%	Total	Female	%
(June 1979)	Staff	98	3	3	699	24	3
	Fellows	82	2	2	31	4	13
	Corresponding Fellows	7	1	14	-	-	-
	Associates	1360	90	7	236	19	8
	Total	1547	96	6	966	47	5
(Febr. 1980)	Totally paid (T)	210	9	4	707	26	4
	Partially paid (P)	56	4	7	9	4	44
	Unpaid (U)	1140	79	7	227	21	9
	Total	1406	92	6.5	943	51	5

Our survey was conducted among the scientific female personnel as listed in September 1979. Of the female research physicists in this sample, 10% are fully paid by CERN, while the large majority, 86%, are not paid by CERN. In Category II, only 38% are unpaid, while 60% are fully paid by CERN. These data are shown in Fig. 1, where the shaded regions of the histograms represent the corresponding number of respondents to our questionnaire. The relatively low percentage of responses from unpaid visitors may be due to the fact that they are often absent from CERN.

We have further divided our sample according to nationality:

Italians (I) : 21
French (F) : 14
United States (US): 9
British (GB): 7
Other (O) : 11

(where the last category includes four Germans and two Belgians, as well as Argentinian, Austrian, Finnish, Greek, and Swiss respondents), and according to profession:

Theoretical physics	(TH):	7
Experimental physics	(EP):	36
Astronomy	(AS):	3
Technical	(TN):	4
Programming	(PR):	12,

where the "Technical" category includes two engineers, one machine physicist, and one technician. The numbers in each class are obviously too low to allow statistically meaningful inferences on national or professional trends, and this should be borne in mind in interpreting subsequent tables and histograms where we have made no attempt to indicate statistical errors. Nevertheless, it is likely that some of the variations in responses according to national or professional identity are more meaningful than mere statistical fluctuations, and we feel it is of interest to display them. In addition, trends according to profession are not uncorrelated with those according to nationality, as there is some correlation between these two classifications, as seen in Fig. 2, which indicates in particular an Italian penchant for experimental physics and a British preference for programming.

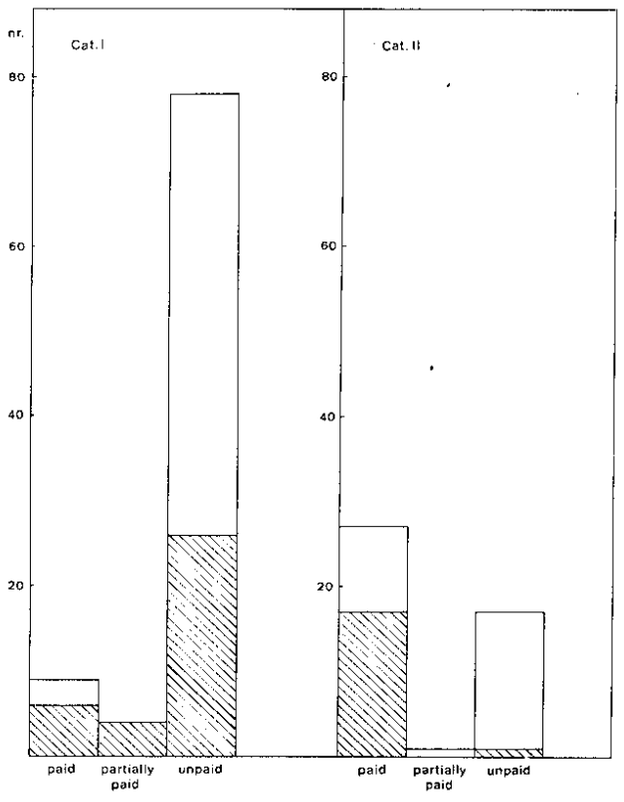


Fig. 1 Job profile of scientific and technical women at CERN (Sept. 1979) and of respondents (shaded).
Category I : high-energy physics research.
Category II: machine physics, engineering, programming, health physics, astronomy (ESO).

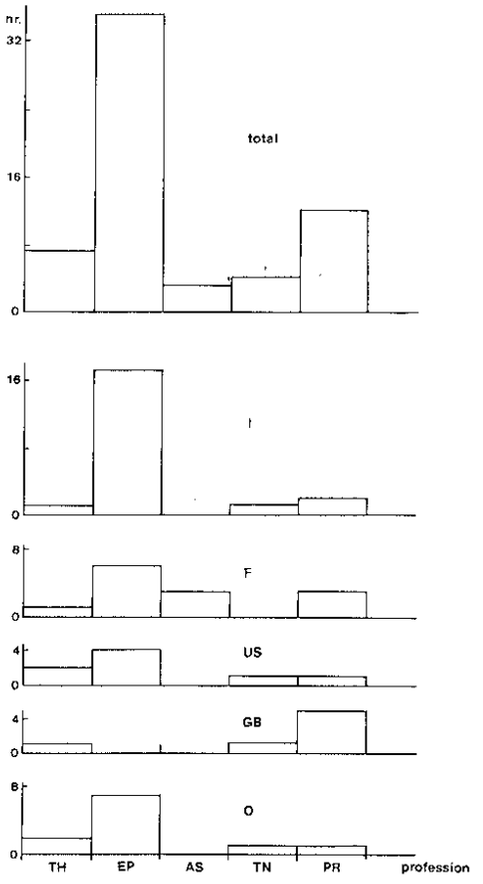


Fig. 2 Profession versus nationality of respondents

Figure 3 shows the age distribution of the respondents, together with a national breakdown. We remark in passing that while 13 respondents are 40 or over, and 25 are 35 or over, we know of only one instance*) in which a woman has held a position of responsibility (division leader, group leader, etc.) or decision making (experimental program committees, for example) at CERN. Finally, Fig. 4 shows the domestic profile of the respondents in terms of the number of their children.

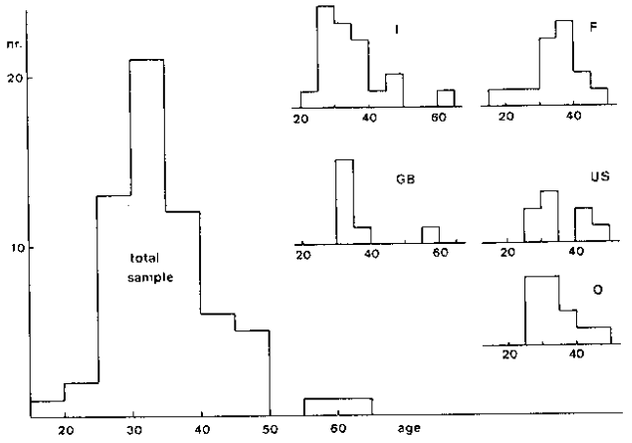


Fig. 3 Age distributions of respondents

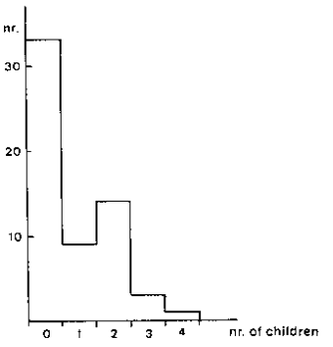


Fig. 4 Number of children of respondents

1.2 Experience of women at CERN

Thirty-four percent of the respondents said that they have at some time been refused a position at CERN. The breakdown of responses according to profession and nationality is shown in Fig. 5. To the query on reasons given (officially or unofficially) for the refusal, the responses included:

a) too many applicants
b) insufficient funds
c) someone from applicant's home lab already taken
d) not sufficiently competent

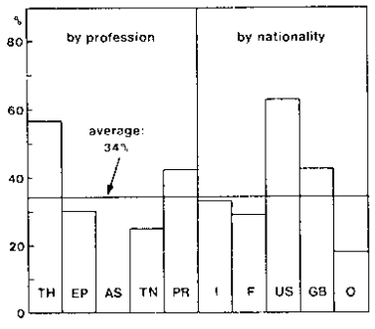


Fig. 5 Have you applied for a position at CERN and been rejected? Percent of "Yes".

*) Hildred Blewett, now retired. However, we have not done exhaustive research on this question. We note also that there are women visitors who hold responsible positions at outside institutions.

e) too young
f) too old
g) stay as unpaid visitor at CERN already too long
h) not a national of a Member State (American)
i) husband is CERN employee
j) priority given to unemployed men.

Responses of the type (a)-(e) have presumably been made to male as well as female applicants, and we have no way of judging whether or not female applications were weighed together with comparable male applications prior to rejection.

Responses (f)-(h) are also superficially non-sexist, but they entail specific CERN policies which we believe are inherently discriminatory towards women, as follows.

Point (f): Women are often slower to develop in a competitive field, both for domestic reasons (the burden of child care is traditionally left to the woman) as well as for psychological reasons (she is often brought up to have a comparatively low expectation for achievement).

Point (g): In many cases (see below) women spend long periods at CERN as unpaid visitors, not by professional choice but in order to be with their mates. A woman who came to CERN under such circumstances, at a time when her professional development was too limited for a CERN position, may subsequently find herself barred from consideration for a position for which in the interim she has become professionally qualified.

Point (h): This point has more general relevance than to the professions considered here or to the specific nationality cited. The point is that because of CERN's location it is virtually impossible for spouses of CERN employees or visitors of any nationality to find gainful employment outside CERN. The situation is generally less critical in Member States where the common market at least partially eases the problem, or even in the United States where an effort is often made to help spouses of visiting scientists obtain work permits.

Points (i) and (j) are blatantly sexist. Point (j) speaks for itself. Point (i) is not just an administrative matter of nepotism, but carries with it the implicit [and, in some cases cited, explicit*)] assumption that the female applicant does not require a salary because she will be supported by her husband. More generally, there is a tendency to consider a female applicant within the context of her domestic and marital status: 23% responded that they were questioned on marital status in their job interview, 12% on the number of children, and 16% on the duration of their husband's contract. To our knowledge such considerations do not enter into decisions concerning male applicants. In addition, 3% of the respondents had been refused part-time work requested.

Twenty-nine percent of the respondents said that they came to CERN to accompany a husband or companion, rather than for reasons directly related to their own careers. The professional

---

*) One respondent quotes a CERN official roughly as follows: *"We never give a salary to physicists who are wives of male physicists; there are too many of them and we would have no basis for discriminating among them."* [And all orientals look alike. Editor's note.]

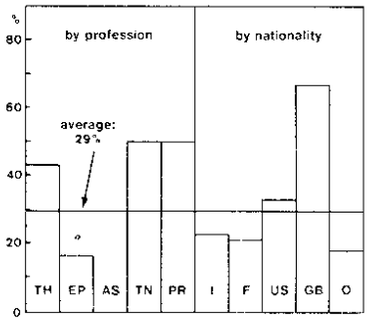


Fig. 6 Did you come to CERN to follow spouse/companion? Percent of "Yes".

and national breakdown is shown in Fig. 6. (Five percent replied that their husband or companion had come to CERN to accompany them.) Of those who did not come on their own professional initiative, 35% assessed the impact of the period at CERN on their careers as helpful and 47% as harmful. Many respondents in fact had mixed feelings. There was a feeling, particularly among research physicists, that CERN offers unique opportunities as a centre of attraction which can only be helpful. On the other hand, there can be barriers to fully capitalizing on these opportunities if one is not yet sufficiently professionally developed or does not feel integrated into one's group because of a "special" (generally unpaid) status. In addition, long-range career development has suffered in many instances. Respondents cited the problems of a break in career or a stint as "unpaid associate" which is not helpful for promotion considerations at one's home institution, as well as the necessity to accept positions beneath their true qualifications. To quote a programmer:

"My career has been hampered by having to change jobs every two or three years. This means I lose something in seniority and since I am always given jobs where my specific experience does not count, I do not advance in responsibility in my job."

To the question, Do you feel that your present position at CERN is comparable to those of male colleagues of similar ability, experience, and seniority?, 35% responded "Yes" and 16% "No". The breakdown according to professions and nationalities is given in Table 2. Some respondents cited specific examples where they felt that men of comparable qualifications had been promoted ahead of them. There were remarks from several respondents of Category II (of which the majority are fully paid CERN employees, Fig. 1) that equal treatment is applied in the lower grade levels (up to about the equivalent of associate professor) but

Table 2

Do you feel that your present position at CERN is comparable with those of male colleagues of similar ability, experience, and seniority?

	Yes (%)	No (%)		Yes (%)	No (%)
Total	35	16			
TH	14	14	I	38	20
EP	33	11	F	36	31
AS	100	-	US	22	33
TN	33	50	GB	50	17
PR	25	42	O	44	9

not beyond. There are only two permanent female physicist staff members, and these are "lab staff" as opposed to regular staff. Experimentalists remarked that many of their male colleagues believe that women are best suited for handling "software" and are not expected to participate fully in all aspects of experimentation. A remark from Theory Division was that a long-term position as an "unpaid associate" is a uniquely feminine career in that division. It was also remarked that men have fewer constraints -- such as child care -- on their commitment to their career.

Figure 7 shows the distribution of the percentage of women colleagues in the respondents' groups. In this context "group" was not precisely defined, but was intended to imply (and hopefully was interpreted as) that body which the respondent felt to constitute her immediate colleagues. The average percentage of women at the respondents' home institutions apparently exceeds that at CERN. The respondents' assessment of female sharing in responsibility and decision making is shown in Table 3, and Table 4 compares attitudes at CERN with those elsewhere. Germans tended to find CERN an improvement over their home situations:

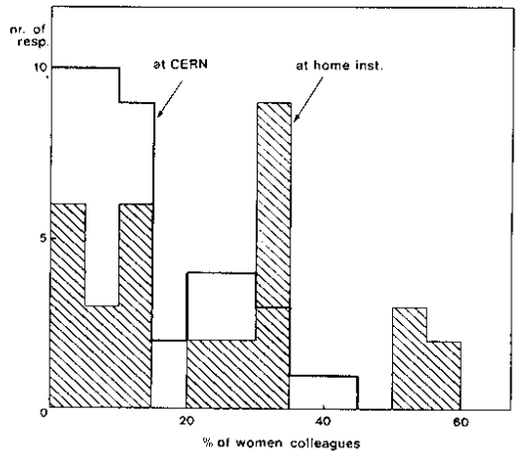


Fig. 7 Percentage of women colleagues in respondent's group at CERN and at home (shaded histogram).

Table 3

Do women in your group have a fair share of decision-making and positions of responsibility?

	Fair share (%)	Inadequate (%)	No share (%)	Do not know (%)
Total	40	11	11	11
TH	29	-	43	-
EP	50	14	3	8
AS	33	67	-	-
TN	25	-	25	25
PR	25	8	17	25
I	29	19	5	10
F	29	14	-	29
US	44	-	22	-
GB	43	-	29	-
O	55	-	18	9

Table 4

In your experience, are the attitudes at CERN better than, worse than, or the same as at other places?

	Better (%)	Worse (%)	Same (%)	Both (%)	Do not know (%)
Total	10	27	44	3	6
TH	-	57	29	-	-
EP	17	17	47	-	-
AS	-	33	33	-	-
TN	-	25	50	-	25
PR	-	42	42	-	-
I	-	24	57	5	5
F	7	29	43	-	-
US	-	56	22	-	-
GB	-	29	43	-	-
O	36	9	36	-	-

"I know of no place where research possibilities are as bad as in Germany... Women, even good ones, have been dismissed because it was not accepted that they wished to combine a family life with a career."

"... exploitation going beyond legality, with no regard for the future of a person."

French and Italian respondents tended to find similar or better conditions at home compared to those at CERN. Generally, CERN was classed as being less good than the Catholic countries (including Ireland and Poland) and better than Germany, Switzerland, and England. The remark was also made that the situation of women is good in the French and Italian experimental physics groups at CERN. Americans tended to feel that the situation at CERN is worse than at home. European physicists who have spent some time in the United States expressed the view that 10 or 20 years ago conditions in the US were much worse than in Europe (including CERN now), but that today (presumably due to the force of the feminist movement) they have surpassed Europe. Some comments:

"CERN is officially fair, but less open than the United States; true attitudes are more difficult to know."

"There are more women physicists in Europe, but fewer in decision-making positions."

In contrast, astronomers find that conditions at CERN (ESO) are much better than in the US. However, representatives of all job categories commented on the lack of women *"at the top"* at CERN and ESO. There was also a comment that, while the respondent's own position was satisfactory, women in technical groups were systematically relegated to unqualified manual jobs; and also that professional equality could be achieved, but only at a personal sacrifice which is not asked of a man.

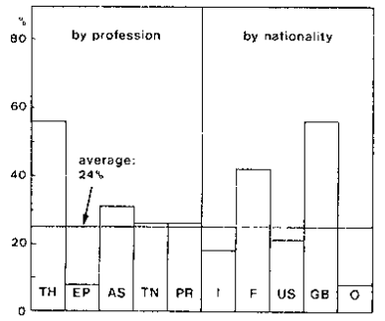


Fig. 8 Would you say that you have experienced discrimination at CERN? Percent of "Yes".

Twenty-four percent of the respondents said that they felt they had experienced discrimination at CERN. The professional and national breakdown is given in Fig. 8. The discrimination felt takes many different forms:

"Fully accepted by the collaboration, but not paid."

"I have always been ignored for promotions."

"Undue interest in my husband's situation."

"Pension rights not extended to husband."

"Not formally, but in subtle ways affecting my self-esteem."

"In little ways every day."

And on the contrary:

"My colleagues behave more nicely to me than to males; they seem afraid to attack a woman -- but that is their fault."

1.3 General professional experience

Eleven percent of the respondents are now in a profession which was not their first choice. The reasons for changing are varied. Thirty-nine percent have worked without pay (Fig. 9) at some time during their career, although this was for a period of a year or longer for only 15% of them. The reasons given were:

to finish thesis:	8%
to follow spouse/companion:	21%
no job available	71%.

Of the 39% quoted above, 42% reported a negative psychological impact: *"loss of self-esteem, self-respect", "humiliating", "confidence destroying", "financial dependence"*. However, several felt that while such a situation is depressing, it is preferable to not working at all; and it is more bearable when one realizes that it is not uncommon (specific to CERN) and provides an opportunity for learning (specific to CERN).

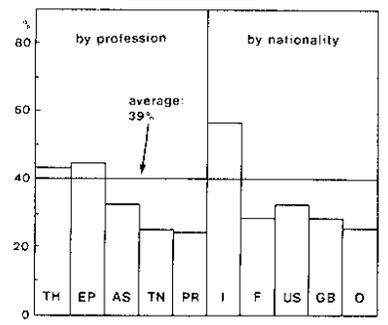


Fig. 9 Have you ever worked without pay? Percent of "Yes".

Table 5

Do you feel accepted as a professional equal by your male colleagues?

	Now			In the past		
	In all respects (%)	In some respects (%)	Not at all (%)	In all respects (%)	In some respects (%)	Not at all (%)
Total	39	50	2	23	50	8
TH	43	43	14	14	57	29
EP	39	53	-	28	42	8
AS	100	-	-	-	100	-
TN	50	50	-	25	75	-
PR	17	58	-	17	50	-
I	19	71	-	29	43	10
F	57	36	-	14	64	-
US	22	44	-	-	67	-
GB	43	43	-	29	29	14
O	54	36	9	27	36	18

Table 5 shows the respondents' assessment of the level of acceptance by their male colleagues, at the present time and in the past. In most cases the level of acceptance felt has increased, but a few respondents said that as students they were better accepted by their peers than as professionals. One programmer commented that she worked well with male programmers, but finds that the physicists she later joined treat her as a *"servant"*. Some other remarks:

"I feel a woman has to be constantly on guard against being considered a computer."

"Without exception I find that men cannot accept the wives of their colleagues as colleagues in their own right."

"The necessary availability is not possible to a woman."

"Yes in French labs, but there is a reticence among certain national groups at CERN."

"Yes, except by some technicians."

"Men are interested in my work, but not in working with me."

"Women have to be more highly qualified to be accepted."

"Male attitudes change after a woman's marriage; she is then considered a wife first."

"Equal professionally but not in decision making."

"Large numbers of women would help."

"Not given a chance to try something new."

Table 6 shows the way in which respondents evaluate the qualifications of their women colleagues. While some responded that they had no women colleagues, a clear majority found their women colleagues as qualified as the men, if not more so; there were several comments that a woman must be exceptionally qualified to obtain a position. Other comments included

"Male and female qualities are complementary in scientific research."

"Women are less able to do certain jobs like moving heavy equipment."

Table 6

Are your women colleagues as well qualified on the average as the men?

	Yes (%)	No (%)		Yes (%)	No (%)
Total	69	10			
TH	86	14	I	62	10
EP	78	6	F	79	14
AS	67	-	US	44	-
TN	25	*)	GB	57	14
PR	50	25	O	82	9

*) have none: 50%.

as well as the observation that women on the technical staff are generally less well trained than their male counterparts.

1.4 Domestic experience

Twenty-seven percent of the respondents (Table 7) stopped work for some period (one year or more for 10%), and 11% have worked part time for some period. The reasons given for stopped or reduced professional activity were:

chose to stop for child care	21%
followed spouse/companion; no job available	33%
pregnancy	17%
health or family reasons	8%.

Of these respondents, 21% replied that their careers suffered *"significantly"* and 17% *"somewhat"* as a result; 29% reported a negative psychological impact. Some comments:

"It is impossible to stop working in experimental physics; I gave 60% of my salary to a nurse."

"I asked for a part time job after my first child and was offered a lower grade."

"Frustration; I had to accept an unsatisfying job."

"Career suffered, but less important than husband's; I am content."

Table 7

Career continuity

Did you	stop working for some period? (%)	work part-time for some period? (%)	pursue an uninterrupted career? (%)
Total	27	11	53
I	29	14	43
F	28	7	64
US	33	22	56
GB	43	14	43
O	9	-	72

Of the 27 respondents who have children, whether or not they stopped or reduced their professional activity, 15% replied that their career was slowed *"significantly"*, and 48% *"somewhat"*, by the child bearing/rearing period:

"Although my career has in principle not been affected, in practice I feel the strain of the situation and have not performed as well in my job as I did before having the child."

When asked whether they felt that their husband's career had been affected by their own, the replies (percent of the total sample) were:

Helpful 2%
Harmful 10%
No effect 26%.

The respondents' evaluation of the adequacy of their domestic support is given in Table 8.

Table 8

Domestic help

Do you have sufficient help with the household (% of 62 respondents)			
	Sufficient (%)	Insufficient (%)	None (%)
from:			
spouse/companion?	37	10	5
hired help?	32	6	11
others?	3	-	-
Do you have sufficient help with the children (% of 27 mothers)			
from:			
spouse/companion?	67	15	4
hired help?	67	7	4
others?	7	-	-

Most did not consider this an insurmountable problem. To the question, Do you plan to have children in the future? the response was:

Yes 26%
No 39%
Don't know 23%.

Of those who answered "Yes" or were undecided, 55% plan to continue working full time, 22% to work part time at least for some period, and 3% would stop work for some period. Of those whose reply was "No", the reasons given were:

No desire 17%
Have enough or too old 17%
Fear interference with career 29%.

Several respondents indicated a desire for children, but were hesitating because of career problems: either the inherent strain and demands of double responsibility, or a fear of

being discriminated against for promotion*). Finally, respondents believe that child care/household responsibility should be

shared equally by the parents: 68%

vary with the professional imperatives of the parents: 38%

mostly the mother's: 0.

(Some answered affirmatively to both of the first two options.) Comments:

"Children should be raised by the couple; this is also important in forming children's attitudes."

"A favourable social structure is needed."

"A mother is better able to care for children."

1.5 Social-educational experience

Respondents were asked to assess the influence that various elements in their educational and social experience had had on their pursuit of a scientific or technical career. The responses are tabulated in Table 9 in terms of percentage of respondents. With elements "graded" on a scale of +2 to -2 (very positive +2, somewhat positive +1, neutral 0, somewhat discouraging -1, very discouraging -2), the average grades, with a breakdown according to nationality, are plotted in Fig. 10. It should be remarked that many respondents indicated only positive influence. In addition, the fact that the sample involves women who are actually

Table 9

How do you assess the influence of the social and educational atmosphere on your pursuance of a scientific/technical career?

Influence from	Encouraging		Neutral	Discouraging	
	Very (%)	Somewhat (%)	(%)	Somewhat (%)	Very (%)
Family	48	16	16	13	
Elementary School	12	16	47	3	2
High School	27	37	18	8	3
Friends	16	21	34	8	2
Other adults	12	10	27	10	2
University	40	29	6	12	2
Graduate	23	24	16	3	
Immediate colleagues	29	21	23	5	3
Professional community	16	26	19	13	3
Spouse/Companion	40	15	8	8	
Your children	10	2	10	6	

*) One German respondent was told explicitly by professors that her career would suffer upon marriage or motherhood.

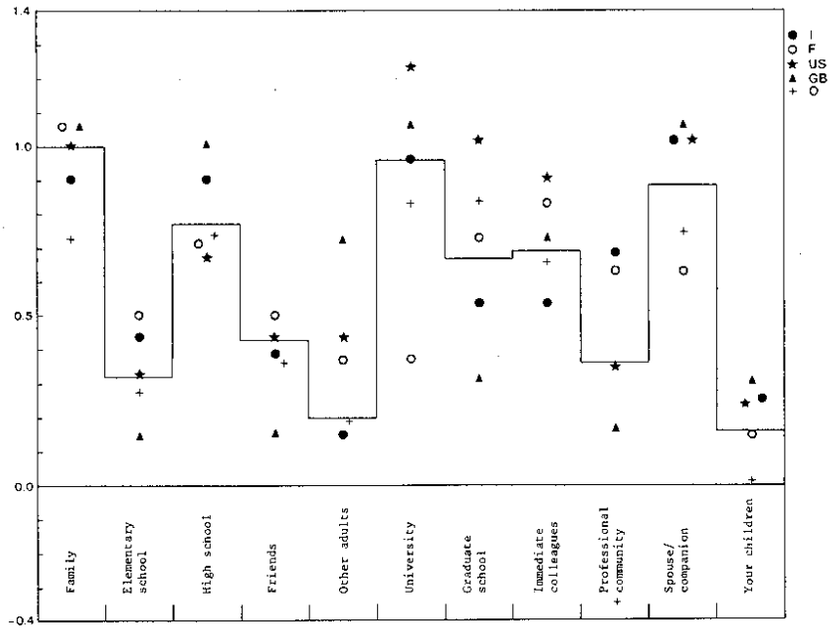


Fig. 10 Respondents' evaluation of influencing factors in their social and educational background (see text).

pursuing scientific or technical careers implies that no influence could have been decisively discouraging. Therefore the "grading" should probably be interpreted on a relative rather than an absolute scale. Some comments:

"A discouraging factor is the knowledge that very few women find satisfactory jobs in universities and research labs. It's a feedback process! If more women were hired, more would be willing to pursue a scientific career."

"I wanted to do research since childhood. I was encouraged by my immediate environment, but I had to learn defence against masculine attacks in school (two girls to 150 boys)."

"In my family one pursued studies according to one's capacities."

"I was discouraged by other physicists who said the job was too hard for a woman."

"I heard opinions expressed against women."

"There are almost no women physicists in high positions."

"My parents admire academic achievement; they were not discouraging, but nevertheless gave me cooking sets, while they gave chemistry sets and microscopes to my brothers."

"Scientific teaching is poor in a girls' school."

"My father wanted me to be a secretary."

Thirty-five percent of the respondents have teaching or advising responsibilities. Their personal experience regarding the influence of established women on professional aspirants is tabulated in Table 10. Some comments:

"I hesitate to approach an established professional woman; she has enough problems."

"There are no women in my field."

"Female models are important for self-assurance."

"Local attitudes are critical between the ages of 14 and 18."

"One shouldn't make any distinction between men and women."

"Only one woman major liked the female teaching assistant."

Table 10

The influence of established women professionals

	Very much (%)	Somewhat (%)	No (%)	Do not know (%)
Were you influenced by a female science teacher or advisor?	6	23	58	5
Do you find established women in your profession				
important as role models?	26	18	31	13
easier to approach: for help and advice?	3	31	37	18
for professional discussion?	2	26	34	19
Do you find that female students or young scientists approach you more easily than they do your male colleagues?	5	26	29	24

"I am surprised that young women scientists are still regarded as special."

"It depends on the person."

"Women also expect men to be better than women in a given role; we are thoroughly brainwashed."

The respondents were questioned on their interpretation of the reasons for the low numbers of women in scientific and technical professions. Their responses are shown in Table 11

Table 11

To what do you attribute the low number of women in scientific and technical professions?

	Important factor (%)	Contributing factor (%)	Not a factor (%)
Innate difference in			
aptitude	0	6	73
inclination	2	18	58
Learned difference in			
aptitude	38	35	8
inclination	51	30	6
Domestic situation	39	42	3
Discouragement from			
educators	27	43	15
professionals	31	44	8
society	61	26	

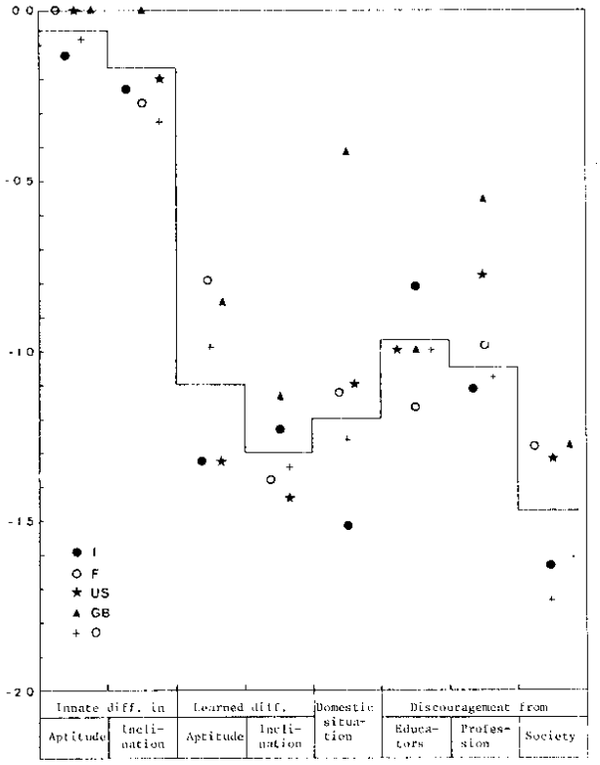


Fig. 11 Respondents' evaluation of factors contributing to the low number of women in technical and scientific professions.

in terms of percentage and in Fig. 11 where "important" and "contributing" factors are given a weight -2 and -1, respectively. Comments included:

"A technical profession is considered as inappropriate for a woman who is supposed to be governed by feelings; pursuing technical studies would prevent her from developing deep feelings for others, for art, nature..."

"Women are educated to be lazy; they know they will get married and become dependent."

"The profession is unattractive to women: too specialized and hierarchical."

"Education is discouraging, one needs strong motivation."

"There is a lack of self-confidence."

"Women are put off by the 'one-upmanship' and competitive atmosphere."

It was generally felt that educational influence was most favourable towards women in Catholic countries, including Ireland, where the heads of three university departments are women. (It was suggested that the importance of the Madonna figure results subconsciously in a better image of women.) It was remarked that the educational/professional/social bias has been especially negative in the United States, but also that considerable progress has been made there, and that American women have the advantage that they *"believe they can achieve"*.

1.6 Opinions on social reform

On the handling of job applications, the response was that women applicants should be

treated the same as men:	77%
given preference if equally qualified:	14%
if slightly less qualified:	4%
taken to fill a preset quota regardless of qualifications:	0.

The majority of women professionals clearly do not want preferential treatment:

"Trying to correct for this type of discrimination does not justify another!"

"If women are given preference, it only adds offense in cases of qualified women: 'she only got the job because she was a woman.' Preference would be a handicap in everyday life."

"Preference would diminish a woman's achievement."

"It is a disservice to women to push those who are unqualified."

"I believe that the numbers of professional women would increase if they were treated in the same way as the men."

"Do not give preference, but encourage applications."

However, some of them perceive a need for provisional compensatory measures:

"Women have been so much discriminated against in the past that they should be actively favoured before a well-balanced situation can emerge, but a quota system might compromise the standard of the institution."

"I do not favour preference, but maybe for a short period to achieve equilibrium."

"There is a need to restore the imbalance and to introduce role models."

"Since women are not treated equally, this should be compensated with some help."

"CERN should be encouraged to increase the percentage of women employed in scientific positions so as to reach the level of the European countries most advanced in this field (Italy and France)."

"The problem is not sufficiently acute to justify a quota system."

-- and for some long-range changes:

"... but men should change their ways of working."

"Women should not ask for favours if they want equality, but society should help mothers."

"A happy medium must be found between treating women fairly and giving them so many privileges that they become unemployable."

A majority of the respondents endorsed an effort to promote qualified women to positions of influence, responsibility, and decision making, as well as to positions of "high visibility", as shown in Table 12. Comments included:

"An insufficiently qualified woman would be a bad advertisement."

"Men should also be highly qualified for such positions."

"If a woman is less qualified because she was obliged to interrupt her career, efforts should be made to give her a chance to recover."

"Most women don't want responsibility, but should be able to have it if they wish to."

"A decision against a woman should be carefully justified."

Table 12

Should a special effort be made to promote women to positions of

	Only if highly qualified (%)	If as qualified as the average male (%)	Even if less qualified (%)	No effort needed (%)
influence/responsibility/ decision making?	5	77	5	2
"high visibility"?	6	56	2	2

Table 13

Do you recommend that:

	Yes (%)	No (%)
efforts be made to accommodate couples		
in the same field?	29	6
via cross-field co-operation?	23	2
each person should be treated on an individual basis regardless of the situation?	53	3
couples should not be hired within the same Dept. or Division?	5	29

Table 14

If a couple applies for a similar position and only one post is available, how should the offer be made?

	If qualifications comparable (%)	If clear difference in qualification (%)
To the man	2	0
To the woman	3	0
To the best candidate	44	89
It should be left to the couple to decide which one of them takes it, or to share it	47	3

Tables 13 and 14 summarize opinions concerning the problem of couples seeking employment. Most respondents simply checked in Table 13 the statements which they endorsed, but some registered disagreement, most emphatically against regulations forbidding the hiring of couples in the same department:

"It is really the clause which handicaps many women."

"Why?!"

"This is obviously nonsense -- you would have to forbid marriage or liaison also."

It was also emphasized that efforts to accommodate couples should not ignore qualifications. Respondents were overwhelmingly in favour of taking the most qualified candidate in the case of a double application, if there is a clear distinction. For a more ambiguous case, opinion was split between the "best" candidate and the couple's choice. One opinion:

"Let the couple decide, but it is best for the family if the man takes it; he will have more material advantages."

And:

"The problem of couples is one of the most difficult. Each case should be considered seriously on the basis of qualifications. CERN should help the non-hired member to obtain a work permit from the Swiss authorities which will enable him or her to find an occupation on the local market."

To the question, If age is a consideration in job availability, should women be given a dispensation for child bearing/rearing years?, the response was

Yes: 69%

No: 6%.

Of those who favoured a dispensation, the suggested period was

less than one year: 5%

one year/child: 21%

(1-4) years: 19%

5 years: 16%.

Comments:

"I doubt that one can fix a number of years to be given a woman as compensation, but age limits should be used loosely, with consideration for personal history."

"When the CNRS in France discussed an age limit for entering the CNRS it was with a dispensation for military service for men) and a certain number of years per child for women. The second point was considered obvious and not subject to question."*

Two respondents favoured a similar dispensation for husbands, and several harshly questioned the policy of age being considered at all with respect to job eligibility. The worry was also expressed that a motherhood dispensation might ultimately be harmful:

"Many countries which allow women to take off several years for child bearing and rearing show distressing reductions in the employment of women -- not an easy question to resolve."

It was also emphasized that a woman who embarks on a late career, once her motherhood responsibilities have diminished, is likely to be highly motivated and therefore not a *"risky investment"* if taken as a Fellow even beyond the usual age limits.

To the question, Should there be a special job category which does not fall under the usual national, age, and time-limit restrictions designated for spouses of CERN employees?, the response was

Yes: 21%

No: 42%,

with some comments categorically opposed:

"Strange question."

"Proposition aberrante."

"They should not be treated differently."

"This would amount to second-class citizenship."

"It would be another form of discrimination."

"It would discriminate against spouses not in physics."

"This is a dangerous practice because it will put women into a special and very easily lower category."

---

*) To quote a male sympathizer: *"I hope we all agree that bringing up children is a more effective way of preserving our species than doing military service."*

While others recognized a problem particular to CERN:

"I think CERN is a special case since it is so difficult for non-Swiss to get work permits."

"No, but a greater effort should be made by CERN for CERN wives in the Cantons of Geneva and Vaud."

"No, but there should be some form of help (Fellowship?) to prevent breaking one's career."

"The present policy of supernumerary or Lab Staff is not satisfactory."

"It would be practical; I'm not sure it would be good."

Several respondents favouring such a provision emphasized that it should include spouses of visitors and be applicable to both men and women.

To the question, Should part-time scientific/technical careers be made a viable option?, the response was

Yes: 58%

No: 16%,

with 11% adding *"Yes, for both men and women"*. Negative responses included:

"Difficult in research; anyway one is free to organize one's work around the family."

"Not realistic in research, frustrating."

However, some respondents favoured the possibility, at least as a provisional solution:

"Only for a limited number of years."

"When the child is small."

"Better than full-time, unpaid work. However, even if paid part-time, physicists have to work much more because of shifts, conferences, all-day work."

"Not unless it is also available to men, otherwise it would lead to an underestimation of women."

"Mostly temporary; it depends on the work."

"It keeps one from losing touch."

And a few saw it as a positive option:

"For both men and women: less unemployment, more leisure time."

The responses concerning an all-day child care centre were overwhelmingly favourable, as indicated in Table 15. Facilities and support for unpaid visitors are endorsed a little more strongly than for staff, and families with only one working parent are considered less in need of such a facility, although it was remarked that *"one not working may be because*

Table 15

Should an organization like CERN provide for child care and in what form?

	Financial support (%)	On-site facilities (%)	Nothing (%)
Staff	13	61	6
Paid visitors	13	63	5
Users and unpaid visitors	15	66	3
Single parents at CERN	19	63	3
Both parents at CERN	29	68	2
Working parents, one at CERN	18	69	3
One at CERN, one not working	15	48	10

there was no kindergarten available", and also that *"financial support should depend on salaries"*. One respondent supported facilities for women employees only. Respondents were asked to provide information on similar facilities elsewhere; this information is included in the Appendix. Some respondents expressed the fear that on-site facilities would help turn CERN into a *"ghetto for the privileged"*; facilities *"should be provided only for unpaid visitors, while staff children should be integrated into local communities"*. Some felt that CERN's responsibility might extend beyond pre-school years: *"CERN should exert more influence on schools in the Pays de Gex and on the state to send good professors with adequate pay for living in the region. It is hard for a working woman to make up the deficit left by the local schools where children's studies are compromised with respect to other regions. CERN has an obligation with respect to the Lycée International de Ferney-Voltaire"*.

2. OPINION FORUM

In this section we present a few more personal perceptions of the general problems, as well as of steps which might be taken to alleviate them. These are quoted, paraphrased and/or translated from letters and free comments submitted with the questionnaires.

2.1 The problems

"Simply stated, we start with a number of handicaps, which I order in importance according to my personal experience.

i) Our self-image. Typically a young woman physicist sees herself as possessing the character traits:
a) intelligent, curious, hardwoking, dependable, enjoying her work;
and lacking the traits:
b) aggressive, know-all, competitive, leader.
We were brainwashed to believe this since the cradle, and are probably brainwashing our daughters. One does not find a group leader lacking the traits (b), but I have met some who possess only (b).

ii) Biology. The desire (either conscious or subconscious) to have children overrides worldly ambition in most of us. For a number of years our attention focuses on those babies, and physics becomes a second priority. The subconscious can be very subversive, rationalizing the desire for children by minimizing the value of the possible contribution to science of one lone woman physicist (you are no Einstein, right?) which feeds back to (i).

iii) It is a male game whose rules we have not really learned.

iv) Men's prejudiced view of women. No matter how hard you project an aggressive, competitive image, a great number of men see you through filters. Women, for them, cannot be leaders of men (unless possessed, like Joan of Arc). At best, the best of them will treat you as a daughter/sister/mother, depending on the age relation. This again ties in with (i).

All the above handicaps conspire to put a woman about ten years behind in career aspiration and goals. She treads water, doing subordinate research gratefully, being apologetic to her male colleagues of the same age group for not killing herself doing research. At the

same time, being conscientious, she is working a 16-hour day, pre-school children being a full-time job by themselves, and feels guilty for the enjoyment she still gets from the work away from the children.

By the time a woman overcomes point (ii), and learns to project a positive image and to assimilate some of the rules of the game (i, iii), the men of her age group have long been entrenched in the interesting research posts (possibly with the help of her apologetic labour, or even original ideas that she has humbly offered). Men of her age group may be influencing decisions, and, judging within their male context, choose young men who are less critical and who obey the rules of the game.

How can very many women apply for fellowships when the age limit is 35? Or for a scientific associateship, when they have to compete with full professors? And if there is a rule against employing two members of a family? I think that CERN can and should take positive steps in recognizing that women are handicapped with respect to men in this profession -- just as it is helping small countries by giving special consideration to the difficulties of doing research there."

(Anna Vayaki)

* * *

"My experience as a woman in physics is not very long, but I think I encounter difficulties which men don't: my work ... is seldom considered by male physicists as being serious. At least, that is the impression I get when I have the opportunity to discuss it. Nevertheless, ... they talk about it, they request reprints, and they use my results. However, they rarely want to work with me, so it is extremely difficult for me to have contacts, discussions, or help at a scientific level from male physicists, and I am quite isolated. Male physicists with whom I share an office often try to have me do things which are usually done by a private secretary... I wonder if they ask the same of their male colleagues... It is hard for me as a woman to make friends among my male colleagues... .

I have no children, mainly because I did my Ph.D., the housework, had only temporary work contracts, and had no parents or in-laws to help... . I feel more and more tired trying to overcome everyday difficulties which are not connected to physics... .

In my opinion, the present low number of women physicists is indeed mainly due to a lack of applications ... as defined by staff: 'having no financial support from elsewhere' ... and secondly to the fact that at <u>all</u> stages women encounter difficulties, sometimes insuperable, which men do not... ."

(...)

* * *

"I was most attracted to theoretical physics, but hesitated because of a lack of preparation as well as a lack of self-confidence. I hoped to make up for the former at summer school, but my application was refused along with another (very brilliant and motivated) candidate from the same women's school, while six candidates from the parallel men's school were accepted. This was the only discriminatory act which I experienced in France. I thus entered experimental physics, where the substantial number of women colleagues facilitated my integration. I turned much later to theoretical physics because of family imperatives. I was hardly better prepared at that point and had to assume teaching as well as domestic responsibility; together with commuting, the transition was made all the more difficult.

We are, of course, ourselves responsible for our own lack of courage. Fortunately, times have changed and women have become conscious of their potential. Nevertheless, the very low number of women in theoretical physics indicates that the barriers have not yet all fallen. I believe the number of professional women must reach a critical level so that other women will be encouraged. This is not yet the case."

(Magda Ericson)

* * *

"WOMAN PHYSICIST???

Definition of the perfect physicist (wihtin, of course, the currently accepted frame of reference): asexual and single-minded (i.e. one who is interested in only a small piece of physics, specialized and well-defined, as well as in a certain type of 'success'), entirely sterilized of all concerns regarding real life; no personal constraints.

For the man:

Within the currently accepted reference frame, a man must conform to the above definition for a period which varies according to the degree of his ambition and his professional interests. Moreover, the existing economic, social, and family structures allow the man to enjoy a certain form of personal life, as long as, in conformity with these structures, the woman (his wife) is available for taking care of all "material" problems as well as seeing to the elementary needs of her mate. A man may also have children, as long as their upbringing is left entirely to the care of the woman. In addition, the existing institutions encourage benevolently the present system of structures. For example, at CERN an effort is made in favour of the woman's leisure activity and the child's social and intellectual development: the kindergarten; various clubs where women who find themselves in an alien environment may have a chance to meet compatriots and to develop new personal and social relationships; financial support, e.g. children's allowance (which is higher than in any individual country), reimbursement of all or of a large part of school expenses, head of family allowance, etc.

Thus, a man has the necessary conditions and support enabling him to pursue his vocation as a physicist.

For the woman:

She has two alternatives:

i) To conform to the above definition (which choice I shall call "integration"). As long as she does so, I believe her chances are practically equal to those of a man to first order. Second-order effects might be that she finds it a bit harder to be recognized, that she must always be a bit more impressive than the most impressive guy, but that is the price of integration.

So I see no real problem in this case, which, anyway, is of no real interest to me, as I consider it as marginal and not at all representative of women in physics. In fact, often flattered by her uniqueness, the woman in this category will sometimes have very anti-feminist reactions, for fear of finding herself reassimilated to her original condition if she supports or appears to support other members or her sex.

A woman may conform to this definition for some period of time. For this reason, conditions during school years, and for a short period at the beginning of their career, are more or less equivalent (and essentially unstable) to those of their male colleagues.

The difference with men comes at the transition phase, when one wishes to go beyond the above definition. This may happen at the very beginning or never at all, depending on the individual, one's "philosophical aspirations", and one's circumstances. In the case of a woman there is no possibility for a smooth transition: it's a clean break, an abrupt transition to the second category.

ii) *To be a woman physicist*

When a woman physicist wishes to think of herself both as a woman and as a physicist, in other words, when she wishes to pursue both a personal life and a professional career with all the responsibilities encumbent on each, then the real problems enter (all in first order!).

While a man in the same transition period finds a social structure which allows him (through his wife) to delegate personal responsibility, the woman will find, at best, a companion to share all her problems (and in so doing multiply them by two). It is here that, in my opinion, the real problems appear for them both, if they have opted for the "historic compromise" -- equality -- for this simply runs counter to the established order. From then on they will both be in a constant struggle, out of phase with existing structures. External conditions, social, administrative, etc., are of no help to them -- on the contrary -- and in physics they both find themselves in competition with people who have no preoccupations other than their particular well-defined research task and the professional "achievement" towards which they aspire. This scenario, nevertheless, describes the most favourable profile.

The alternative profile is more bitter: the case in which a woman accepts second-rate status, once and for all, and assumes all the responsibilities of both her work and of her daily life. This case interests me less, because I consider it anachronistic, with no justification and no recourse.

What seems important to me is that both the man and the woman who have opted for equality find themselves equally confronted by common difficulties, that their struggle is common -- otherwise there is a rupture."

(Aurore Savoy-Navarro)

* * *

Finally, the testimony of a concerned male physicist:

"Unfortunately, we are products of our society and we are all, to a larger or smaller extent, unconscious antifeminists ... let me quote examples:

... We were meeting to decide on speakers for our annual conference. Someone suggested a man. I proposed his wife instead, for I thought she was a better speaker. People only laughed nervously and without discussion decided on the man.

... There was a couple, both candidates. They worked together, having very similar recommendations from the same people. There was no easy way to tell them apart. Someone then suggested as a joke that we take the woman and leave the man to hang around, and everybody present, certainly including myself, laughed. Again, without any further thought, we took the man and left the woman to hang around."

(Chan Hong-Mo)

The above remarks were all volunteered by research physicists. While the questionnaire responses tabulated in Section 1 do not display a greater degree of objective discrimination experienced by this category of respondents, it is certain that their relative numbers are extremely small. My own conviction is that the highly competitive nature of scientific research, and more particularly of high-energy physics, makes it necessary for one to have a high degree of confidence in one's potential for achievement in order to pursue it seriously. Women, on the average, are simply not programmed to possess the necessary confidence, and many do not wish to sacrifice the personal, affective aspect of their lives to free themselves for the required devotion to their profession. The competitive aspect of high-energy research has been most marked in the United States. This may be a contributing factor to the fact that there are still far fewer women physicists there than in, say, the Catholic European countries where many more card-carrying physicists, both men and women, tend to view their profession as a job like any other.

On the other hand, the American culture is less steeped in traditional structures and tends to recognize and reward achievement. Thus, to my knowledge, successful women physicists, including Europeans, hold or have been offered more prestigious and responsible positions there than in Europe -- which is not to say that equality has been achieved there[2].

My own experience as a graduate student in the United States was that, while many members of the professional community implicitly or explicitly expressed skepticism as to my ultimate survival in the field, there was no question of being refused the chance to try and that judgement on achievement was essentially objective. On the other hand, when I arrived in Europe as a married woman, and a short time later became a pregnant one, I was met with blunt refusals to my attempts to be integrated into the existing structures which permitted the start of a professional career -- often on the grounds that I had not gone through the traditional educational route from which physicists were regularly recruited, a route which at that time was open only to males. Evidence of my past achievement record, such as recommendations or grade transcripts, was disregarded as irrelevant. Twenty years later I feel accepted as a professional equal, with all the privileges and responsibilities that this may entail, by the vast majority of the American particle physics community, whereas in the European community where I have spent the bulk of my career, I still perceive a degree of paternalism among elements of the established community.

2.2 The remedies?

"What is to be done?

With no reference to Lenin intended, and without attempting to propose a concrete plan of action, I believe it is of fundamental importance to effect a 'renormalization' of established values. Behind this formal language, I find that we physicists are, in the majority -- incredible but true -- socially regressive. I believe that the fundamental goal of society is to allow the individual to pursue the vocation of her/his choice, to realize her/his potential -- with the understanding that those tasks which are uninteresting and tiring, but necessary, are our common responsibility, to be shared equally by all. In particular, for those who enjoy physics:

i) men and women must be treated equally. This means:
- *they must be provided with the same objective conditions for realizing their potential in their profession;*

- *they must be judged in the same way, according to their capacities and without reference to their personal situation, for professional contracts;*
- *structures must be established which aid both in the same way (just as they presently exist for men): day care centres for babies and after-school care centres, job possibilities for the spouse if one member of the couple is required to work away from the home institute for an extended period of time. Obviously these points require serious reflection as to how they might be realized.*

ii) There must be a considerable effort at the level of social and educational formation, so that future generations will not resemble 'Mom and Dad'.

iii) Avoid the ghetto -- which might be created by asking for special dispensations for women -- and the marginal situation which results from 'integration'.

iv) It seems to me very important that the struggle for change be a common struggle of men and women who recognize that the present reference frame is out-dated."

(Aurore Savoy-Navarro)

CERN obviously cannot attack the problem of women's educational and social background. However, this should not be an excuse for ignoring the issue. As an institution, CERN has the possibility and, we believe, the responsibility for equalizing material conditions for men and women as suggested by numerous respondents:

"Maybe it is not up to CERN to provide jobs for spouses, but at least they could provide

i) job counselling;

ii) pressure on Geneva authorities for work permits in the private sector;

iii) removal of any restrictions or negative feelings against spouses working at CERN. I see no reason, assuming the couple is agreeable, why they can't work together in the same group."

"Any antinepotism laws at CERN should be abolished; check that CERN is in conformity with the antidiscrimination rules of the EEC; find qualified female candidates for the CERN staff."

"An effort is needed to assure on-site facilities for child care, or the availability of nearby ones."

"Ensure an educational system for the children of all ages, of a quality comparable to that in the home countries."

"After childbirth, a woman should have the possibility of working half-time for a period up to two years; at that time she could make a decision as to whether to stop or to resume a full-time career. Unpaid leave should be more easily available during this period as well as better insurance. A woman should not lose non-resident allowance upon marriage."

"I would highly recommend the solution adopted at LBL for wives who, having tenure somewhere else, cannot stop working without losing their jobs, but must remain at LBL/Berkeley to be with their husbands: a part time contract -- one can work as much time as one wishes or is able. This type of contract can be renewed without problem -- and is much more satisfactory than the 'full-time unpaid' contract of CERN, offered with the line 'we hope you have other means of subsistence' -- as though they are not sure our husbands will continue to feed us."

* * *

"Utopia:

i) Put the age limit up by five years for women applicants for fellowships.

ii) For associates, judge a woman together with the applicants five years her junior.

iii) Give corresponding fellowships to women of all member countries and not just to applicants from small countries.

iv) Establish special one-month and two-month visitor appointments timed with the academic training programs. Introduce young and not-so-young women physicists to other older and established women physicists. Help them to make contacts appropriate to their background. Arrange enough pay so that mothers of pre-school children can afford to apply.

It should be stressed that contacts are very important both for men and women. One way of establishing early contacts at CERN is through the summer student program; favouring women candidates at this level would be especially constructive. It is not what you are, but the people who know what you are, that determines your future."

(Anna Vayaki)

As individuals, members of the professional communities at CERN and elsewhere might develop a higher degree of sensitivity to the intellectual and professional aspirations of women and to the barriers to their realization -- both material and psychological -- which we have tried to document here.

"A suggestion for positive action in the case of CERN would be to make sure that the committees which select Fellows and visitors and decide on promotions are selected from among persons who have a feeling for the problem, so as to make sure that at least no blatant discrimination takes place."

"I recommend that at every job interview of a female, one person be responsible for ensuring that no discriminatory questions are asked (e.g. 'how long is your husband's contract?') and that no such issues enter into the discussion following the interview."

"I have an ideal in which child care is assumed as a service to the community... . Then it is up to the woman to decide what proportion of her time should be given to child care or to her career. Housework is a necessity for every individual, man or woman, and thus no excuse for part time schemes. I believe and hope that this will happen one day and so shall only accept schemes leading to that ideal, and not anything that may impede progress towards it."

These barriers are not so easily overcome. An illustrative study is an article by J. Cachalou based on 1977 statistics on scientific personnel in the CNRS (France). The percentage of women researchers is relatively high (29%), which Cachalou attributes to a favourable historical and psychological context:

i) Research is a relatively new profession, unencumbered by tradition; moreover, the CNRS was founded by Joliot-Curie.

ii) Research was developed after the war when there was a shortage of manpower.

iii) The universities grew considerably in the 50's. There are more possibilities for advancement in the university, which was thus preferred by men, leaving positions available in the CNRS.

iv) The public image of research is considered compatible with the image of women, i.e.
- not directly productive, therefore not demanding or competitive;
- requiring intuition, patience, precision.

On the basis of the women's average age, rate of publication, and number of registered patents, Cachalou concludes that their influence and responsibility, in terms of job level, positions in scientific adminsitration, and representation on national committees, is disproportionally low in comparison with the quality of their work. She attributes this to various sociological factors:

i) prestige associated with the "grandes écoles", particularly Ecole Normale Supérieure, rue d'Ulm (for men);
resistance on the part of men -- decision-making is a masculine privilege.

ii) reticence on the part of women -- possibility of conflicts with personal life: demanding hours; associated prestige of woman (especially in provinces) might endanger couple.

Cachalou further points out that the percentage of women researchers in the CNRS has steadily decreased (most markedly in life sciences were it was nearly 50%) since 1967 when it was 34%, in spite of the fact that the number of women with university degrees has increased. She attributes this decline both to a changing social context and to the fact that a feminine influence has never been established:

i) economic recession and masculine reaction; no further expansion of universities, so more men CNRS candidates;

ii) lack of feminine solidarity and organization;

iii) neutrality of established women who had a hard fight themselves, and are necessarily exceptional;

iv) lack of interest of male-dominated national committees.

As emphasized by one of our respondents:

"Until there is pressure for more advancement of women to higher grades where they can have more influence on other decisions, I feel improvement will be slow in coming."

Such pressure has existed in the United States over the last decade in the form of governmentally imposed "affirmative action" programs. Yet the record is still poor according to a recent article by Vera Kistiakowski who concludes[2]:

"There is no compelling evidence that girls are not equally endowed with the abilities necessary to become successful physicists. There is overwhelming evidence that the attitudes of society and the pressures of marriage and family have made this much more improbable for women than for men... . And indeed, there are very few women physicists for whom there has not arisen some career obstacle, whether internal or external, directly attributable to their sex. But if we are indeed to take seriously the ideal that participation in physics should be based on interest, aspiration and ability, then certainly no individual should be discouraged on any grounds other than these."

3. CONCLUDING REMARKS

We have tried to summarize the way in which women in scientific careers at CERN view their professional status. In Section 1 we reported on responses to our questionnaire (we should emphasize that all questions which were asked are covered in the report), and in Section 2 we presented the more personal commentaries that we received. Our sample is necessarily statistically meager, and in fact represents a select group of women, since they are among the few who did manage to overcome whatever barriers may exist and are pursuing scientific careers. Moreover, they have been able to work at CERN, which is considered a privilege among both men and women scientists in Europe, and requires both the initiative and material conditions necessary for an uprooting from one's home environment. Our sample obviously excludes those women who may have wished to come to CERN but were unable to for domestic reasons or lack of support -- either within CERN or from their professional establishment at home.

Moreover, only about 40% of the questionnaires distributed were returned. One might interpret non-response as indicating a lack of interest or a feeling that no problem exists. This was not necessarily the case, at least for the non-respondents who were questioned on their reasons. The questionnaire was rather long and detailed, and some women felt that it would serve no purpose as *"nothing would be done anyway"*. Some who started to respond abandoned the effort because it was depressing or painful to be asked to recall the demoralizing experiences which they have by now overcome or learned to live with.

In addition, Fig. 1 shows that the majority of paid personnel responded while the majority of unpaid associates did not. As mentioned previously, this may be related to the simple material fact of limited presence at CERN. To see to what extent this might introduce a bias, we report in Table 16 some responses, particularly relevant to CERN, of 23 paid and 32 unpaid respondents as compared with the total sample.

Table 16

Responses according to paid or unpaid status at CERN

		Paid (%)	Unpaid (%)	Total sample (%)
Do you feel that your position at CERN is comparable to those of male colleagues (Table 2)?	Yes	65	22	35
	No	17	16	16
Share of responsibility and decision-making of women in your group*) (Table 3)	Fair	41	44	40
	Inadequate	9	20	11
	None	24	14	11
	Do not know	17	9	11
Attitudes at CERN compared to outside institutions (Table 4)	Better	13	8	10
	Worse	28	20	27
	Same	46	50	44
Have experienced discrimination at CERN (Fig. 8)		39	23	24

*) The responses of some associates refer to their home groups.

We have also collected various suggestions on how the professional situations of women might be improved. In Section 1.6 we saw that 77% of the respondents do not favour a preferential treatment of women applicants. The comments quoted suggest that this reflects an understandable fear on the part of successful career women that their success could be attributed to something other than their professional competence. They also contain the implication that the present situation is in fact not equitable; indeed, 77% endorse an effort to promote women to positions of responsibility and influence, and 69% favour an age dispensation for motherhood.

What seems important to us is that the problems brought out in this report, and their need to be addressed, must be recognized, so that existing discrimination -- explicit or implicit -- can be eliminated, even if this may require some temporary compensatory measures.

* * *

REFERENCES

1) J. Cachalou, Courrier du CNRS, April 1979, p. 30.

2) W. Kistiakowski, "Women in physics: unnecessary, injurious and out of place?", Physics Today, Feb. 1980.

APPENDIX

CHILD-CARE FACILITIES

A.1 SUMMARY OF THE ACTIVITIES OF THE CERN DAY-CARE CENTRE WORKING GROUP

In the belief that it is necessary to offer facilities not only to families with one non-working parent (as is the case for the present half-day kindergarten) but also to those with two working parents (which is impossible within the existing structures in Switzerland), a group formed spontaneously at the beginning of 1978 with, as its primary objective, the opening of a day-care centre at CERN.

April 1978: A petition supporting the opening of a day-care centre accumulated about 400 signatures after only two days of circulation.

May 1978: The Executive Committee of the Staff Association delegated a Working Group to study the project.

June 1978: A questionnaire was distributed and about 90 replies were returned, corresponding to about 30 children for an all-day nursery school which was later (July 1979) accepted as a realistic first step. (The remaining responses were relevant to infant care or to children who would be too old by the anticipated date of fruition of the project, i.e. September 1979.)

June 1978-Jan. 1979: Studies were carried out, along with meetings with social and pedagogical experts, and a visit to the United Nations day-care centre. Estimates were made of material needs, necessary personnel, and space. At this stage the idea of an infant care centre was temporarily abandoned because, among other things, of the inadequacy of the existing buildings.

April 1979: The first meeting of the Working Group with the Steering Committee of the existing kindergarten: the Steering Committee appeared strongly opposed to the project, but offered no real basis for its position.

May 1979: Second meeting with the Steering Committee: their position was still negative. (On the other hand, the opinion of the majority of the parents of children in the existing kindergarten and of its staff appeared favourable.)

June 1979: In spite of the numerous obstacles encountered and the consistent lack of support, the Working Group set up registration for an all-day kindergarten to open in September 1979. Nine children had already been enrolled, when the Executive Committee of the Staff Association voted against the project.

(Suzy Vascotto)

The Group asked that an all-day kindergarten be opened on a trial basis with CERN guaranteeing to cover expenses for the first year. This was in fact done in the case of the existing half-day kindergarten. The position of the Association was that permission to open should not be accorded until after a sufficient number of children were enrolled to guarantee that there would be no deficit. (All the more difficult as we were proposing a graded system of fees, as is customary in other day-care centres in the Geneva area, based on family salaries and the fact that families with CERN salaries are largely reimbursed.) We know of no other centre which has opened under a similar constraint.

In a letter addressed to the Working Group, the Staff Association justified its position on the basis of a separate investigation of services in Meyrin and an independent cost evaluation. They concluded that the projected enrollment would be insufficient to cover costs, but nevertheless recognized the needs:

"We wish to emphasize that the Staff Association did everything in its power to satisfy the request for opening a day-care centre, for we are convinced that there were good reasons for doing so, in particular:

- *A service like the kindergarten should operate in accordance with the working hours and the needs of CERN employees; it is consequently illogical that a working couple is unable to make use of the present kindergarten.*
- *It is indispensable for visitors to be provided with suitable facilities at an accessible cost.*

Taking into account these arguments, and given that it is impossible for the Staff Association to subsidize an important deficit and that the existing facilities in Meyrin are open to CERN Staff, we should make an effort to see whether the existing difficulties can be overcome by collaborating with the local authorities. Although this solution has undeniable disadvantages, at least it has the merit of encouraging the integration of Cernois with the population and, with our support, would contribute to the amelioration of local social structures for the entire population."

(Franco Francia)

The following is an excerpt from a response to the Staff Association:

"Our idea was to simplify their life, to offer a child-care facility which was reliable, where they could follow closely their children's development. Thus it was really a matter of addressing a more general social problem. To demand, as you did, that the project be self-supporting was to condemn it: you know as well as I do that even if one reduces expenses to a minimum, this type of service almost always requires some subvention. We did not ask the association to provide whatever subvention might be necessary, but to ask that CERN finance a project of general social value. I am still convinced that you would have succeeded had you tried... ."

(Suzy Vascotto)

A.2 NOTES ON CHILD-CARE FACILITIES ELSEWHERE

During the summer of 1978 I learned that a similar project was being studied at Fermilab where the existing facility was also a half-day centre, organized essentially as a co-operative effort of non-working mothers and addressing their needs. The proponents of an all-day centre

had met with difficulties similar to our own at CERN, but they enjoyed the full support of the Fermilab administration. The position of the Director's office is well expressed by the following quote from a letter in support of the project to a representative of the Department of Energy:

"We are convinced that the establishment of such a facility on site will permit more women to enter the job market. It will also ease the complications of the professional wives of our Users who wish to follow their own careers while in this area. It has been fairly difficult for some of them to do this to date and has caused a considerable degree of unhappiness."

Permission to open an all-day centre on a trial basis under the auspices of the Universities Research Association was granted by the end of 1979. The school opened full time on 2 January, 1980, with three children enrolled. The enrollment is now up to five on Mondays and seven on the remaining work days. Parents of eight additional children have expressed an interest in enrollment starting 1 June, if the program continues. Children are accepted from the age of two years (or if toilet trained) up to six years. The present feeling is that *"the program will make it"*.

In response to the questionnaire, the following information was also offered:

"In Greece, child-care is available in many forms. The civil service has an organized crèche and nursery system with a reduced fee for civil service employees."

"I have had experience with a very good crèche at Gif-sur-Yvette which is half financed by the CNRS. It serves CNRS personnel who are working in the surrounding labs."

"In Orsay there are beds in a nearby crèche; there is a recreation centre for children from the ages of 3 to 12 years on Wednesdays and during vacations."

"Some sections of CNEN in Italy provide crèches for the children of parents working there, and so do some industries."

"The Liquid Paper Corporation in Dallas, Texas, gives six months maternity leave after childbirth. From the age of six months a nursery is provided for children of employees, followed by kindergarten services with certified teachers until the age when the child enters primary school."

"While visiting SLAC during the summer of 1971 I was able to make use of the day-camp centre on the Stanford campus for the child who was accompanying my husband and myself."