

**New research on women, science and higher
education:**

Proceedings of the conference

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Athena Project

The Athena Project was established in 1999 to encourage strategies, promote good practice and offer incentives for the career progression of women in higher education employment. Athena's specific focus is women in science, engineering and technology. Athena's work has included the awarding of 11 development grants to UK higher education institutions and the creation of five local academic women's networks.

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*Professor Dame Julia Higgins
Chair of the Athena Advisory Committee*

Foreword

According to recent statistics, girls now outperform boys at every stage of education, from seven to graduation from university. Of 265,000 people who graduated from universities in 2001, 55% were women. In spite of the closing gender gap in higher education achievement, women are still under-represented in academic employment, most notably at the higher levels. Even in the biological sciences where women obtain more than half of all doctorates, only 9% of professors are women. In many other sciences, such as chemistry, mathematics, physics and engineering, women occupy 2% or less of the top posts. As one of the following presentations points out, women continue to be consumers, rather than producers, of higher education.

There is currently a high level of interest in this topic, namely: women's engagement with the knowledge economy and, in this instance, with science. There is mounting evidence of how and why women do not take full part in scientific endeavour. I am pleased to welcome this report on the proceedings of the September 2001 Athena conference. It is aimed at all those who are involved in shaping the scientific agenda, from scientists themselves to science policy-

makers. In order to advance the agenda of women scientists in higher education, evidence-based policy is required. This means collating and disseminating research findings and harnessing the results to ensure that lasting change takes place. It was with this aim in mind that this event was organised, therefore fulfilling one of Athena's key objectives: to collate and disseminate information. The overall aim of Athena is the advancement of women in science, engineering and technology in higher education. To achieve this, Athena works with higher education institutions to develop, share, encourage and disseminate good practice, as we will hear in the body of this report.

The work of Athena would not be possible without funding from the UK higher education funding bodies, the higher education representative bodies (Universities UK and the Standing Conference of Principals), and the Promoting SET for Women Unit at the Office of Science and Technology; now made available to us through the Higher Education Equality Challenge Unit, of which we have been a part since 2001. We are particularly grateful to the Promoting SET for Women Unit for supporting the Athena research strategy and providing sponsorship for this report. Thanks are also due to the Royal Institution of Great Britain and L'Oreal UK Ltd for sponsoring the conference. Personal thanks for their support go to the events team at the Royal Institution, Dr Keith Gore at L'Oreal and Fiona MacLean of Athena. Finally, special thanks go to Robert White for copy-editing this report.

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*Diane Bebbington
Research Officer, Athena Project*

Introduction

The current context

The conference *New research on women, science and higher education* was organised by the Athena Project to bring together the latest studies that could throw light on why women are still under-represented in academic science, particularly in the higher echelons. Momentum is gathering: the UK government has responded to concerns over the supply of scientists and engineers by setting up a working party chaired by Sir Gareth Roberts¹. Given overwhelming evidence of a 'leaky pipeline' of women from scientific careers, we look forward to the working party's recommendations in this regard.

A further development was the establishment in 2001 of the Equality Challenge Unit (ECU)². The mission of the ECU is 'to improve equal opportunities for all staff who work or seek to work in the UK Higher Education sector'. The ECU aims to work with stakeholders to raise the awareness and profile of equal opportunities, to provide specific advice to institutions to help them secure

¹See www.hmtreasury.gov.uk/docs/2001/scientists.2006.html

²For information contact: info@ecu.ac.uk

improvements in equal opportunities and to help specify appropriate data to institutions to support equal opportunities monitoring. Athena is now part of the ECU and is developing its future agenda in tandem with this new, broader remit.

In terms of gender equality in the UK, the recent Kingsmill Report³ has highlighted the continuing wage gap between women and men. High proportions of women in the UK are part-timers and it is this group that is particularly likely to be low paid. The report underlines the point that, while the gender pay gap has narrowed substantially since the 1970s between full-time women and men, it has changed little for part-timers. Given that a gender pay gap exists for women at all levels on the earnings scale, these findings are relevant for academic women.

The European Union is no less interested in women's position in the scientific community. An active programme in relation to women scientists is being pursued at European level. The Women and Science section of the Research Directorate General⁴ has organised several high profile international conferences, led the drive to develop better indicators on women in science, and published the highly influential ETAN report (European Commission, 2000) that considers on the basis of wide-ranging evidence how the role of women could be enhanced in science, engineering and technology policy and practice in the EU.

Since the conference, important new research findings have been published. A report on women's participation in ITEC careers in six countries, including the UK, finds women generally under-represented among ITEC graduates and severely under-represented in ITEC jobs (Millar and Jagger, 2001). Of even more concern is the finding that their participation has been decreasing in recent years. Only 13% of women in the UK were working in ITEC-related jobs in

2000, a decrease from 16% in 1999.

A study commissioned by the Promoting SET for Women Unit⁵ on women returning to scientific employment aimed to estimate the potential pool of women who could return to science and considered how existing returners' schemes could be scaled up to boost the number of women successfully returning (People Science and Policy Ltd, 2002). This research shows that there is a sizeable pool of women who are not working in SET-related employment and that government-sponsored returners' schemes would have a role to play in helping at least some of these women back into SET. These research and policy developments underline the continuing high level of interest and commitment to improve the situation for women scientists.

This report

The conference presentations⁶ seek to address the question of why, even in scientific fields where they constitute 50% or more of first degree students, women continue to experience difficulty advancing their careers. Heather Eggins, in her opening address, sets the policy context, pointing out that the low representation of women in the sciences⁷ needs to be

³See www.kingsmillreview.gov.uk/docs/Kingsmillreviewreport.pdf

⁴See www.cordis.lu/improving/women/home.htm

⁵For information on the Unit's activities see www.set4women.gov.uk

⁶All the papers published here are as delivered at the conference with minor modifications, except that of Louisa Blackwell whose paper was submitted after the conference.

⁷'Science' refers to science, engineering and technology subjects rather than the broad definition used in other European countries that includes, for instance, health sciences, social scientists and economists. This is the definition used for the Athena Project and is the main focus of this conference.

considered against a backdrop of decreasing numbers of students choosing science subjects as undergraduates. Judith Glover, in her presentation on current perspectives on women's scientific employment, emphasises the importance of realising that sciences where women are well-represented in terms of their overall proportions of the total workforce are not necessarily those in which women have managed to get to the top. Louisa Blackwell, discussing the findings of her longitudinal study using 1971 and 1991 UK census data, concludes that there are gender differences in how scientific qualifications are translated into employment, with SET-qualified men more likely to enter SET-related employment than SET-qualified women. The study is also groundbreaking in highlighting significant differences in family formation patterns between SET and non-SET employed women.

Research by Margaret Blake on gender differences in grant application behaviour indicates that, while women are just as successful as men in obtaining research grants when they do apply, women make fewer grant applications in the first place. A major reason for this is that fewer women occupy positions where grant applications are usually made, such as senior posts. Louise Morley discusses explanatory frameworks for women's under-representation in the academy, including the 'domestic responsibilities' model that assumes a common lifestyle for all women and the notion that women are 'in deficit' and lack the requisite skills seen to be necessary for successful academic careers. She highlights the historical exclusion of women from the academy, underlining the point that even now women tend to enter higher education as consumers rather than producers.

A European perspective is provided by Liisa Husu, who shows that there are significant variations in women's labour market participation in academia across the

European Union. For instance, though gendered patterns of vertical and horizontal segregation are similar across the EU, there are differences in the proportion of women professors in each country. She highlights the point that countries with high levels of political will, childcare provision, and so on, are not necessarily those with higher proportions of women professors. Diane Bebbington and Caroline Fox give an overview of the Athena Project. As part of its research strategy Athena undertook an extensive review of the literature on women scientists in higher education (Bebbington, 2001). A key conclusion is the need to consider women's academic careers at all stages from qualifying onwards, given evidence that progress may be hampered at any stage. There is a need also to acknowledge the diversity of women's experiences in terms of influences of class, ethnic background, and so on. The 11 projects carried out with Athena's development grants are now completed and include mentoring schemes, an initiative to improve women's representation on committees, and tackling career obstacles. A new development is the Athena Awards Scheme for initiatives in higher education institutions that contribute to achieving Athena's goals⁸.

In the final presentation, Diana Warwick considers what progress women have made in reaching senior positions in higher education. Though the proportion of women on science-related public bodies has increased, women are still a minority of heads of higher education institutions. Initiatives such as the Equality Challenge Unit and a forthcoming scheme to provide leadership training within higher education will help to address these shortcomings.

This report illustrates the high level of commitment to improving women's position in academic science and in

⁸Further details from athena@ecu.ac.uk

academia generally. Combined with current developments in the policy arena, let us hope there will be real and lasting change for women scientists' prospects and that science itself becomes fully engaged with the equality and diversity agenda.

*Professor Heather Eggins
Director, Society for Research into Higher
Education*

Opening address

This is a very timely conference. You will have noticed, I think, in the *Times Higher Education Supplement* of September 7th the heading on the back page, 'Science Take Up Declines'. The context in which we are working is, first of all, that there is a continuing drop in the numbers of both sexes in higher education studying science and the continuing drop, particularly in some areas, of women. Let me quote, 'This autumn will see 7.7% fewer chemistry students than last year, 1.2% fewer biology students, 0.6% fewer physicists. Microbiology will drop by 14%, civil engineering by 6.9% and chemical engineering by 3%'. Nigel Paine, Director of Science Year (an initiative that particularly targets 18/19 year olds) said that the number of women entering physics was 'shockingly low'. Obviously it was so low he didn't dare put a figure on it! He said that getting more women and ethnic minorities into pure science must be a priority. However, this is not, as we all know, a new problem.

Historically there have always been fewer women than men studying the sciences at undergraduate level, particularly the hard-edged sciences. Figures in the little pamphlet put out by the Promoting SET for

Women Unit mention that, in 1995, 2,607 men and 1,503 women studied chemistry⁹; 2,004 men were studying physics and only 476 women. In 1999 things looked a little brighter for women, but worse on the whole for science: 2,143 men studied chemistry - that was a drop of almost 500 in two years - compared with 1,481 women, a figure that stayed almost stable, only reflecting a drop of 22. But in physics the number of men dropped to 1,844 - a drop of almost 200 - and women remained at 476. I'd have liked to have quoted the figures for this year in exact numbers, and if anyone has them in the audience I'd be delighted to give them out later on, but clearly the numbers are likely to have gone down again. One can argue then that women are maintaining their level, but against this background of steadily falling overall numbers.

The second problem that we have been faced with over the years is the problem of employment after an undergraduate degree in science. That problem has not been solved either. On the one hand the country needs good teachers of science otherwise we are not going to get a large number choosing to study science. At 'A' level we need teachers who have a degree in the relevant subject. Biologists teaching physics at 'A' level are clearly less likely to have the breadth of knowledge necessary to inspire pupils to study physics at university. Conversely, a new graduate scientist is faced with a huge differential in earnings according to what she or he chooses to go into. For instance, a starting salary in a big accountancy firm will be £25,000. What chance has teaching? My friend's daughter completed a four-year MSc in chemistry. She informed her father 18 months before the end of the degree that she would not be pursuing a scientific career. She began with one of the large well-known accountancy firms on £25,000 upon graduation. Now only one year following graduation and she is earning £35,000. She is going to do splendidly, you know, so what is the use of a scientific background? One wonders.

Someone told me a few years ago that, at Imperial College, there was a loss in some subjects of 80% (if you can call it a loss) with graduates going into the City from pure science degrees. I wouldn't be at all surprised if that figure does not still hold.

The third problem that we are going to be looking at today has also been with us for many years, and that is the problem of women scientists in the academic profession. Unfortunately, there is almost a rule in the academic profession that, in academic departments generally, the higher the academic grade, the lower the number of women. This is obviously not going to inspire people who are extremely bright to go into an academic scientific career. In 1998 the total number of women professors in physical science and engineering departments - and I quote from a leaflet - was 97 out of a total of 3,092. We are looking at a percentage of 2% or less of professors in many sciences. Biological sciences are the best, where women now gain the majority of doctorates but, even here, they are less than 10% of professors. We can celebrate that but mutedly; one in 10 is not good enough. At the very top - the Fellows of the Royal Society - we find 3.6% are women - minute!

Well then, there is much to be done. I think this conference, despite the problems that I have raised, will strike a positive note. Progress has been made and is being made. Reports will be given of the initiatives recently being pursued and the general raising of awareness that has taken place. We shall hear of the *Women's Scientific Lives* project and the Athena Project. We shall hear of research on women in the academy, European and British perspectives, who applies for research funding, and women

⁹Obtainable from the Unit at the Office of Science and Technology, Department of Trade and Industry, 1 Victoria Street, London, SW1H 0ET.

in the scientific labour market. The Equality Challenge Unit for higher education has just been established and we welcome the Director of the Unit, Professor Joyce Hill, to the panel this afternoon. The Unit will be addressing equalities in higher education employment, not only as they relate to women, but also to people from ethnic minorities and those with disabilities.

The aims of this conference then, can be summed up in a series of questions:

- What can we learn from the research?
- Does progress necessarily have to be slow?
- How can the findings be used to improve the situation for women scientists?
- Where should future research efforts be directed?

The title of the conference marks the recognition of the value of research on aspects of higher education. It both informs us of the realities of where we are and provides us with a sound basis on which to make our policy decisions. We look forward to a stimulating and thought-provoking day.

*Dr Judith Glover
Reader in Social Policy, University of
Surrey Roehampton*

Women and scientific employment

Current perspectives

There are two overarching points that I want to make to you that are going to guide my presentation today. First of all, as has been already indicated, the increase in women's representation in scientific education and employment is slow. Now in many ways that is an optimistic way of putting it. We could say, if you like, that it is stable. It needs to be contrasted with other professions, such as medicine and law. I am talking here just about numbers, not about vertical segregation. In terms of numbers the increase in women's representation in the sciences is slow.

A second overarching point - which I'll come back to at various points in my presentation today - is that there are similar patterns of horizontal segregation in scientific education and employment across industrialised countries. By horizontal segregation I mean men's sciences, women's sciences, if you like. We see some very similar patterns across industrialised countries and we also see very similar patterns in terms of vertical segregation in scientific employment, in other words the tendency for women to be concentrated in low level positions within particular sciences or particular occupations. So there

are two overarching trends to bear in mind.

In the first part of my presentation I am going to give you a brief empirical picture of four aspects of women's education and employment. I do stress that it is very important to see these aspects as distinct theoretically, conceptually and in terms of policy implications, and I will come onto that in a moment. When I have done that I will just talk briefly about the need for new data and the movement, particularly in Europe, to acknowledge that data in this area are sadly lacking and that something needs to be done about this situation.

Lastly, I am going to talk about research issues and then finish on a slightly provocative note which hopefully will stimulate discussion. I hope you won't find this negative and will perhaps see it as kind of 'devil's advocate'. So, I am just going to start then with a few pointers about the empirical picture. There is a full-scale paper in your packs that actually goes into this in a great deal more detail, but clearly I can't do that today in my presentation. I am just going to pick out a few things.

I have always argued in my publications and in my book *Women and Scientific Employment* (Glover, 2000) which Nancy kindly referred to, that we need to see this issue in terms of four distinct aspects. Qualifying is one distinct aspect and translating scientific qualifications into scientific employment is another. A further aspect is persistence, sometimes referred to as retention, an odd term perhaps that seems to be favoured by employers who want to retain staff. At the moment I favour the term 'persistence', in other words women 'persisting' in scientific education and employment and, lastly, advancement. I do think it is very important to see the issue that we are addressing here today as having these distinct themes or aspects. In fact we could argue that there are more than that but for our purposes I will argue that there are just these four. As I have said,

they are theoretically different, conceptually different and they have different policy implications.

First of all to think about qualifying. It is important to get away from this myth, if you like, that women are, numerically speaking, missing from all sciences. This is absolutely not the case - some sciences are numerically feminised and have been for a very long time. There is clear variation by scientific field when we look at qualifying. In some areas you have large numbers of women acquiring science qualifications, in other areas not so. I am now going to move on very quickly to translating scientific qualifications into scientific employment.

Table 3.1 First destinations of science graduates, 1991

Occupation	Men%	Women%
S&E professional	35	30
Management	11	9
Non-S&E professional	7	5
Teaching	12	23
S&E associate professional	4	13
Non-S&E associate professional	7	6
Other	24	14
Total	100% (117)	100% (64)

Source: National Child Development Study, Sweep 5, 1991, reported in Fielding, Glover and Smeaton, 1997.

This is a study that was done by Jane Fielding, who is here today, and myself. We looked at some data from the early 90s. We looked at women's first destinations. What we have is an analysis of what happens to women and men with science degrees, looking at their first destinations. We find that, for women, 30% go into professional scientific employment, 23% go into teaching and 13% into associate professional scientific employment. The latter is a category that is used in the classification to

indicate jobs, such as science technicians, that do not actually require a degree. So what we are seeing is rather a small percentage in terms of scientific employment, quite a large one in terms of teaching (although it has to be said that has decreased over the years), and a fairly large proportion in terms of associate professional scientific employment. This shows under-employment or over-qualification, as it is sometimes referred to.

If we look at men's first destinations, there again this first figure - 35% - does indicate that this is not just an issue of women. This is also a low proportion going into professional scientific employment. Twelve per cent go into teaching, so that is half the figure for women, and 4% go into the category scientific employment, for which a degree is not required. So that is a glimpse of the translation of scientific qualifications into scientific employment using data from the early 90s. But there are small numbers in this table and this is a problem that dogs all analysis in the area.

Moving on to women's persistence in scientific employment, we have research findings which show that when women do stay on - when they persist in scientific employment - their employment is more short-term and discontinuous than men's. Women are more likely to exit in the early years of their careers than men, and also motherhood is related to part-time working or exit. So, typically, when women in scientific employment become mothers they either switch to part-time working or exit in fairly large numbers. The references for that particular piece of research are in my paper. The last point relates to some very exciting new research that you are going to hear about in a moment from Louisa Blackwell. This indicates that women who persist in scientific employment, confirming those earlier findings, but with much larger numbers, have particular demographic characteristics. I won't say any more because I don't want to spoil what Louisa

is going to say, because it is very interesting, exciting new work.

I am going to move along to my fourth and last aspect: women's advancement in scientific employment. An important point to make is that the data that we have here really only refer to academic employment. There is a serious lack of data on the business sector, not just in the UK, but also in Europe. There is clear vertical sex segregation in women's academic employment; in other words women tend to be concentrated in low positions within scientific employment. Importantly, even in sciences where women are numerically well-represented, vertical sex segregation is still an issue. Now that is a very important point as it gives the lie to people who argue that critical mass is what we are aiming for. In other words, get women in and they will somehow percolate up to the top as if by magic. That is not happening. So the sciences where women are numerically well-represented are not necessarily the sciences where women have managed to get to the top.

The point that I am going to make here is the need for new data. There is widespread agreement, in Europe particularly, that the data we have are inadequate; that, in order to develop new policy, we do need to have better data. So we have had a whole series of conferences in Brussels, we have the European Parliament making statements on the issue, Eurostat saying that we need better data, we have the Research Council and the research ministers of the European Union saying the same thing. All this has led towards the European Commission's Women's and Science Unit developing a concerted approach to bringing together the existing data, but also in doing that, showing where the gaps are in the existing data and moving on to making more and more urgent requests in favour of gathering new data.

It is also important to mention the Helsinki

group in this context. Jan Peters is the UK representative of this group, and Frank Rott represents the statistical aspect of the group. A Eurostat publication has just been published, *Statistics in Focus* (Laafia and Laarson, 2001), on the issue of women in science, which will bring together data from the member states. So that is an important use of existing data. But what is very clear is that there are distinct limits on what is already available. A big push will be to gather new data on a Europe-wide level. This would, of course, involve very large amounts of resources and a big political step forward. But my sense is that this is inevitable. There is growing evidence then that new data are needed, but there is a battle for hearts and minds, in my view, that this issue matters.

It is at this point that I want very quickly to run through with you the reasons that this issue matters. There is the equal opportunities reason, the economic growth reason, the economic returns reason - in terms of returns to the individual, the taxpayer and the firm which has possibly invested in training - and a fourth, highly disputed reason, that science would be different if women were better represented. Then there is the last argument about science and society. This is very new and links the women in science issue to the science in society movement.

It is very relevant that the Women in Science Unit in the European Commission has moved from the human potential directorate into the Science in Society directorate. Why has this happened? Well I can only give you a few pointers - the policy documents are pretty new on this - but it seems to me that these are the key issues. Why is it that the women in science issue is being linked to the science in society perspective? The science in society perspective will be one that most natural scientists will be familiar with: the public understanding of science movement. The science in society perspective is about

building a better relationship between science and society. It is about reducing distrust of science and scientists, which it is increasingly felt society feels. The science and society perspective says that we need an economy which is geared to innovation. It follows from that, that what we need is a society that is fully committed to innovation, and it follows from that, that support is needed from a wider spectrum of society. The wider spectrum of society, if we look at the policy documents, are essentially three social groups, and these are seen as having been traditionally excluded from what is known in Eurospeak as the 'scientific venture'. Young people are seen as having been excluded, as well as older people and women. So let us just focus on the last one of those groups.

If we go on to look at the ways in which women are excluded, there is acknowledgement, of course, that traditionally women have been excluded from scientific education and employment - as we know from the subject of this conference. But they are more generally excluded. So, if you like, the first one is about women *in* science and the second one, as I see it, is about women *and* science. The argument goes that if there were more women *and* science, not necessarily *in* science but also *and* science, that somehow women would be more engaged with the knowledge economy, and new, harmonious and productive relationships between society and science would be achieved.

I think there are all sorts of very interesting things going on there, particularly this idea that the specific needs of women should come onto the research agenda. Now that gets into a whole kind of messy area of whether science would be different if more women were involved in it. (This was the fourth 'why does it matter' reason, referred to earlier.) It is highly contentious and I am not going to dwell on it, but just to point out to you that this is how, it seems to me, the issue is being understood in Europe.

I am going to move on from that rapidly, to research issues. We have said that the European Commission and the Helsinki Group are focusing on gathering quantitative data. Quantitative data are clearly essential. Policy-makers take note of quantitative data. But they only really tell us about outcomes. Qualitative data tell us about processes. Now it seems to me that we know very little about what the processes are, in terms of women's experiences of the scientific workplace, of the science department, of the lecture theatre, of the canteen; in other words the institutions of science, the culture of science. By institutions I mean, in a sociological way, the formal and informal rules of science. We know very little about what happens when young women go into a science department at the age of 18 and emerge at the age of 21 or 22. We know very little about what has happened to them culturally, about how the institutions of science have affected them. We need qualitative data to fill us in on that.

I am not saying ignore quantitative data, but I am saying that we need also to think of qualitative data that would tell us about processes. Then we would turn the research gaze, if you like, away from girls and women. We would stop what seems to me to be a clear trend in research in this area for many decades: a focus on what it is about girls and women that is somehow lacking; they lack socialisation, they lack enthusiasm, they lack knowledge or their parents lack it or their schools lack it. This is the so-called 'deficit model'.

If we move away from that model, we then start to focus on the culture of science. We would therefore be considering cultural issues relating to science, but also scientists. Now this is a considerable research challenge. It is very difficult, much more difficult, to investigate powerful people, heads of departments, deans, human resource people; to try to get them to open their doors; to give access to researchers

who want to get in there and to research what it is that is going on during the four years of a degree, or what is going on for someone who is a research officer in, for example, a privatised laboratory. It is a considerable challenge to get the powerful people who are already in the club, if you like, in the science club, to recognise that they have a problem to say 'Yes, it could be that it is not the fault of these women who lack enthusiasm. It could be that there is something going on in our culture which is either putting off women in the first place or causing them, once they get in, not to stay on'. And I suppose that there I am slightly pessimistic. But I have some hope that, if the recruitment issue gets so bad, these powerful people will open their doors and acknowledge they have got to do something to bring more women into their departments, and get them to stay on.

I have tried to give you a glimpse of the evidence that women do rather badly in scientific employment. They leave scientific employment, they conclude presumably that childbearing and child-rearing are incompatible with the scientific culture and, if they do stay on, they tend not to 'get on'.

To finish, then, with my 'devil's advocate' slide. If we know from a growing body of research that women tend to fare rather badly in scientific employment, are we being irresponsible in encouraging girls and women to enter science? I will leave you with that thought. It is a bit pessimistic. It is hopefully provocative, but actually I think it is something that needs to be considered.

Dr Louisa Blackwell
Data Quality Manager, Office for National
Statistics¹⁰

Women's Scientific Lives Project

I would like to begin by acknowledging that I am not the only person involved in the *Women's Scientific Lives* project. First of all, I must mention that the Economic and Social Research Council funded the project and we are very grateful to them. Also, the work was supervised academically by Professor Heather Joshi from the Centre for Longitudinal Studies in the Institute of Education. It also benefited from a Project Advisory Panel, some of whom are here today. The Longitudinal Study is a complex dataset and, in order to access and analyse it, one needs expert technical advice. The advisors that helped me were Kevin Lynch and Sarah Jones, and I would like to acknowledge their involvement.

Judith Glover mentioned four areas of concern in terms of women's involvement in science. *Women's Scientific Lives* addressed the issue that she terms 'persistence': that is, retention in SET. The longitudinal data that we analysed provided a unique opportunity to look at

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the post-qualification experiences of women. We not only looked at women who were actually in scientific education or in scientific employment, but also all that qualified, and what happened to them after qualification in terms of their employment and their life course transitions.

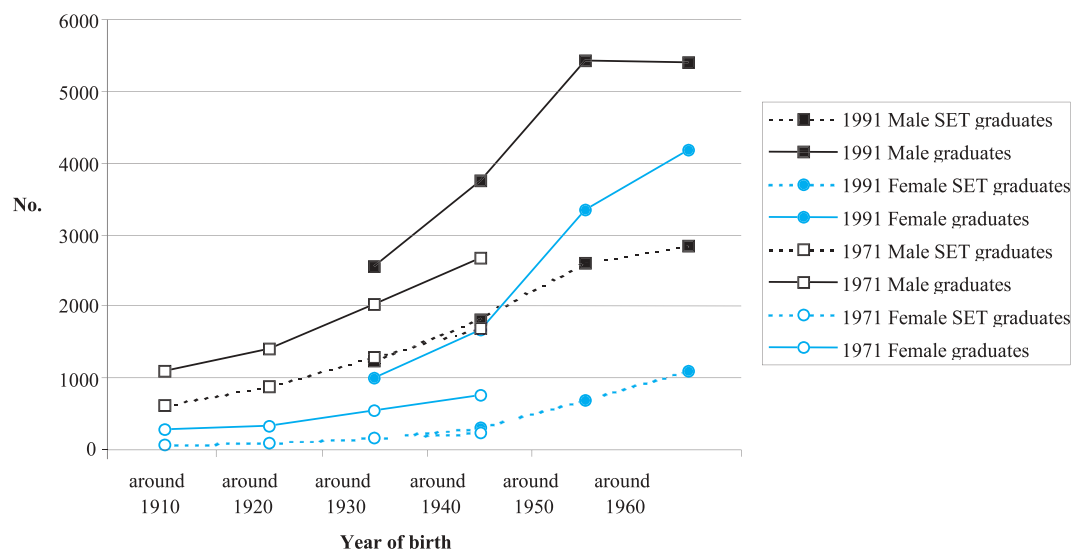
I would like to show you the sorts of research issues that we hoped to address with this project. In the first instance, how do science, engineering and technology qualifications vary over time and across generations? We compared feminisation rates (meaning the increase in the representation of women over time) in different 'SET' subject areas. We also compared qualification rates for different birth cohorts. We can think of a birth cohort as a group of people born in the same period who travel together through time. In addition, we were able to explore their employment and family-building experiences after qualifying.

How do employment participation and SET employment rates vary between women and men with SET degrees, and how are they different to the employment participation patterns of women qualified in non-SET subject areas? Has this changed over time? Our focus was people who had degree-level qualifications in science, engineering and technology. The SET subject areas were selected following consultation with the Project Advisory Panel, and were broadly the same as the Department of Trade and Industry Promoting SET for Women Unit's schema. There are some question marks over whether we should have classed health-related sciences and health-related occupations as SET, but in the following analysis these are separated from other SET subjects and occupations and may be viewed as comparators. I am going to show that, although the LS sample is large, once we focus on women qualified in science, the numbers drop away. This was a real challenge for our project and, in order to

overcome problems associated with small numbers, we combined subjects and occupations.

We found distinctive patterns of family formation, and this has attracted wide media attention. These findings have to be located within the broader context: education levels in general influence marriage, cohabitation and fertility, in that women and men with degree-level qualifications tend to marry and have children later in life. Industrial and technological change, the expansion of higher education and fertility are, it is argued, inextricably linked. *Women's Scientific Lives* broke new ground in finding variations in patterns of family formation by *subject studied*.

Before presenting the results, some words about the Longitudinal Study. The LS is a 1% sample of the population of England and Wales. Further details of the study can be found in Hattersley and Creeser's Technical Volume (Hattersley and Creeser, 1995). The information is linked, providing the opportunity for longitudinal analysis. Because of the 10-yearly interval between observations this is clearly not work history data. Important inter-censal employment transitions are invisible. However, its size and the fact that it (so far) spans three decades makes the LS unique in permitting both cohort and period comparisons of employment transitions at different stages of the life course. It is also the largest longitudinal dataset in Britain, which is particularly important given the focus of this research. Graduates with degrees in science, engineering and technology (SET) are a small minority within the population as a whole. The LS permits some differentiation between different types of SET graduate, which is important given their different family formation and employment patterns. All outputs from the LS contain only anonymised and aggregated information. For this reason some of the details that follow, where they

Figure 4.1 Graduates and SET graduates in 1971/1991, by year of birth

Source: ONS Longitudinal Survey.

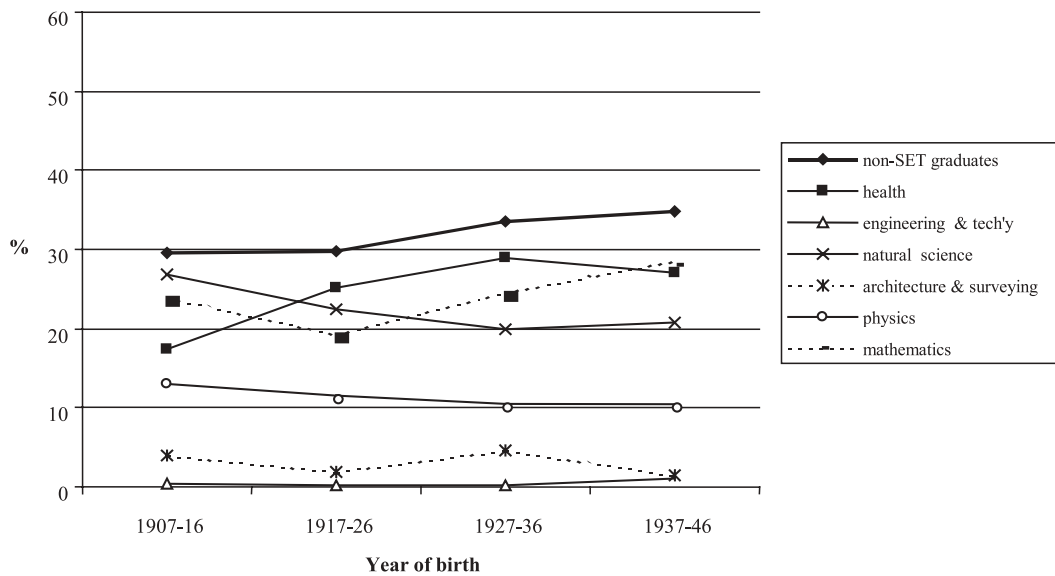
involve small numbers, have been obscured. It is also important to bear in mind that estimates and patterns in the data that are based on small numbers of women will have large sampling errors and will not necessarily be representative.

To describe qualification rates in different SET subject areas we used 1971 and 1991 cross-sectional information, shown in Figure 4.1. This Figure shows the numbers of women and men in 1971 and 1991 with degree-level qualifications, both generally and separately for SET, broken down by year of birth. Cohort comparisons demonstrate that, by 1991, women's representation had increased most rapidly in technology, compared to other SET subjects. Gender parity remained a distant prospect, however, because this transformation was from a very low 1971 base, when fewer than 5% of graduates in these subjects were women.

Most LS members born around 1930 (1927-36) and 1940 (1937-46) are represented in both 1971 and 1991 data. Sample differences (mainly resulting from

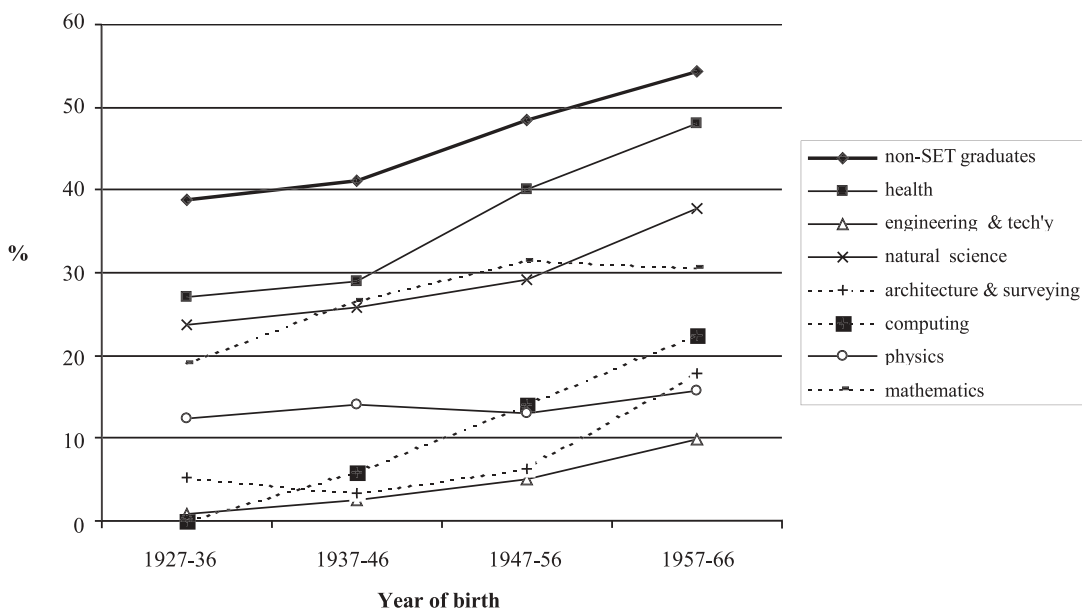
migration and death), and real increases in qualification rates for individuals over time, combine to create the 1971/91 differences in the number with high-level qualifications in these two age groups. We count as graduates those with degree-level qualifications, including professional qualifications at this level. Women and men in each cohort tended to be more likely to have degrees than those born earlier. In 1971 the gender gap in qualification rates was widening, but by 1991 it began to close. This was due to the expansion of higher education in the 1970s and 80s, which particularly benefited women born around 1950 and 1960. By 1991 there were more than four times as many SET-qualified women graduates among those born around 1960, compared to those born around 1930. However, despite this increase, men born around 1960 were more than twice as likely to have SET qualifications than women of the same age.

Figure 4.2 shows that in 1971 the representation of women varied between the different SET subject areas. Health-related science was more gender balanced,

Figure 4.2 % of women in each subject area in 1971, by cohort

while technology subjects were the most male-dominated. Within each subject, the sex ratio within the different cohorts was similar, except in health-related subjects where the representation of women was 10% in the latest cohort, relative to the earliest. Figure 4.3 shows that, by 1991, there was wide variation in the feminisation rates in the different SET subject areas.

Women in later cohorts were as under-represented in physics as the earlier cohorts had been, and feminisation rates in mathematics and the natural sciences were also moderate. However, in the health sciences, those born around 1960 had almost achieved gender parity. In all the 'technology' subjects (computing, engineering and architecture and

Figure 4.3 % of women in each subject area in 1991, by cohort

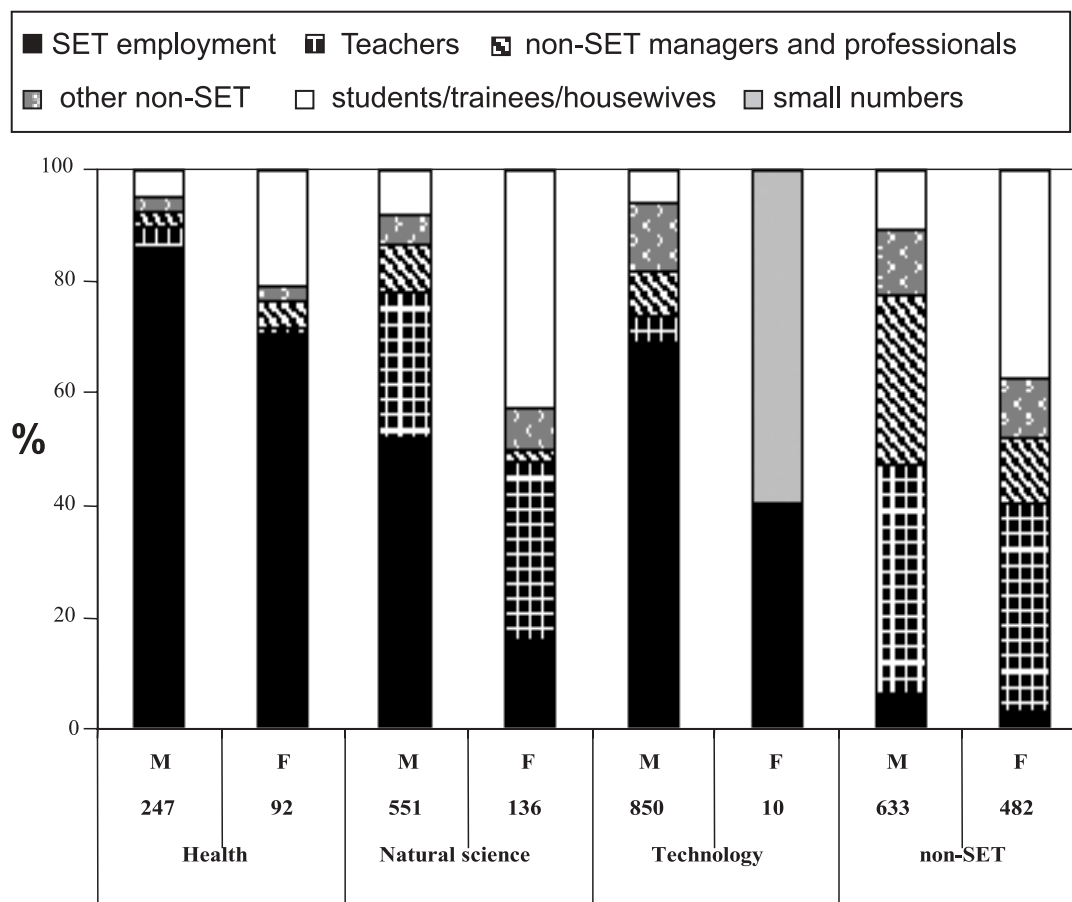
surveying), women’s representation increased most rapidly, including in the emergent computing subjects, though they continued to be a small minority because they started out in 1971 from such a low base.

Now we consider how women and men translated their qualifications into employment. SET employment rates varied between women and men and between the different subject areas: in both 1971 and 1991, men with qualifications in all SET subjects were more likely to work in SET occupations than similarly-qualified women, and SET employment was highest among those qualified in health-related subjects. This is shown in Figures 4.4 and 4.5, for 25-34 year old women and men in 1971 and 1991. Teaching was a common

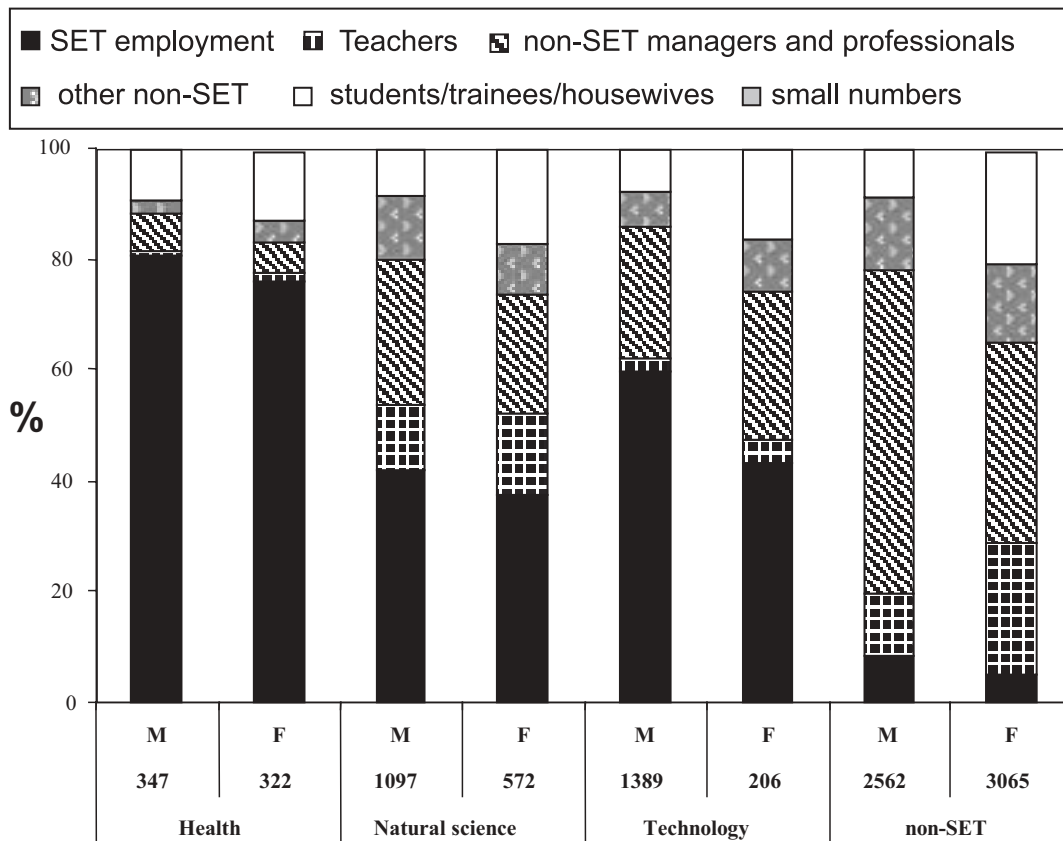
destination among the natural scientists, though less so among later cohorts (shown by comparing 1971 and 1991 graphs).

We compare the experiences of those with degrees in health-related subjects with those qualified in natural science (this includes mathematics and physics), and the technologists (this includes those with degrees in engineering, surveying, and computing). We also show the employment patterns of non-SET graduates. Beginning with the 1971 employment patterns in Figure 4.4, the percentages of SET graduates in SET occupations were generally higher for men than for women. The highly vocational nature of health-related degrees is demonstrated by the high SET employment rates for both women and men with this type of qualification. Those

Figure 4.4 1971 statuses of 25-34 year old graduates



Source: ONS Longitudinal Survey.

Figure 4.5 1991 statuses of 25-34 year old graduates

Source: ONS Longitudinal Survey.

qualified in the natural sciences were as likely as non-SET graduates to become teachers (this includes academic research). In contrast, male technology graduates not in SET employment were mainly employed in non-SET managerial occupations (there were too few women technologists in 1971 for detailed comment).

The 1991 employment outcomes for 25-34 year-olds, in Figure 4.5, can be contrasted with the 1971 outcomes. The gender gap in SET employment rates among SET graduates had narrowed. Women's SET employment had increased, while proportionally fewer went into teaching, which was also the case for men, though the difference was not as marked. In addition, non-SET destinations, particularly at the managerial and professional levels, were more common for both women and men in

1991.

Longitudinal analysis exposes the extent of attrition from SET employment, though our main observations are at 10-yearly intervals and inter-censal occupational change is therefore invisible in these data. Table 4.1 shows the proportions of 25-34 year old graduates in 1981 in health, science and technology occupations who were in the same occupational groupings in 1991. Graduate dropout was higher among the scientists and technologists of both sexes, at 49% for women and 32% for men, than among those graduating in health-related subjects, at 13% and 8% respectively. In both types of occupations, women were more likely to leave than men were. Among women in health occupations at both censuses, four-fifths were mothers compared to two-fifths in science and

Table 4.1 SET graduates aged 25-34 in 1981: 1981/91 occupational stability

SET 'graduates' in:	Men		Women		
	No. in 1981 (a)	At both Censuses (% of a)	No. in 1981 (b)	At both Censuses (% of b) (c)	Of whom mothers (% of c)
Health occupations	236	92	119	87	81
Science & Technology occ's	1067	68	97	51	39

Source: ONS Longitudinal Study.

technology. Further analysis revealed that women who became mothers between the censuses were more likely to stay in SET employment if they were in health occupations, whilst those in science and technology occupations were more likely to leave employment altogether, shown in Table 4.2.

We now turn to the distinctive patterns of family formation found among SET graduates. There is anecdotal evidence, and evidence from case study research, to suggest that women in SET occupations find it difficult to reconcile the competing demands of professional and family life. The conflicts may be more acute for women working in traditionally male-dominated occupations, where working patterns, practices and cultures are based on a hegemonic masculine model.

In the early 1990s employers and managers had become increasingly aware that the under-use of highly qualified women

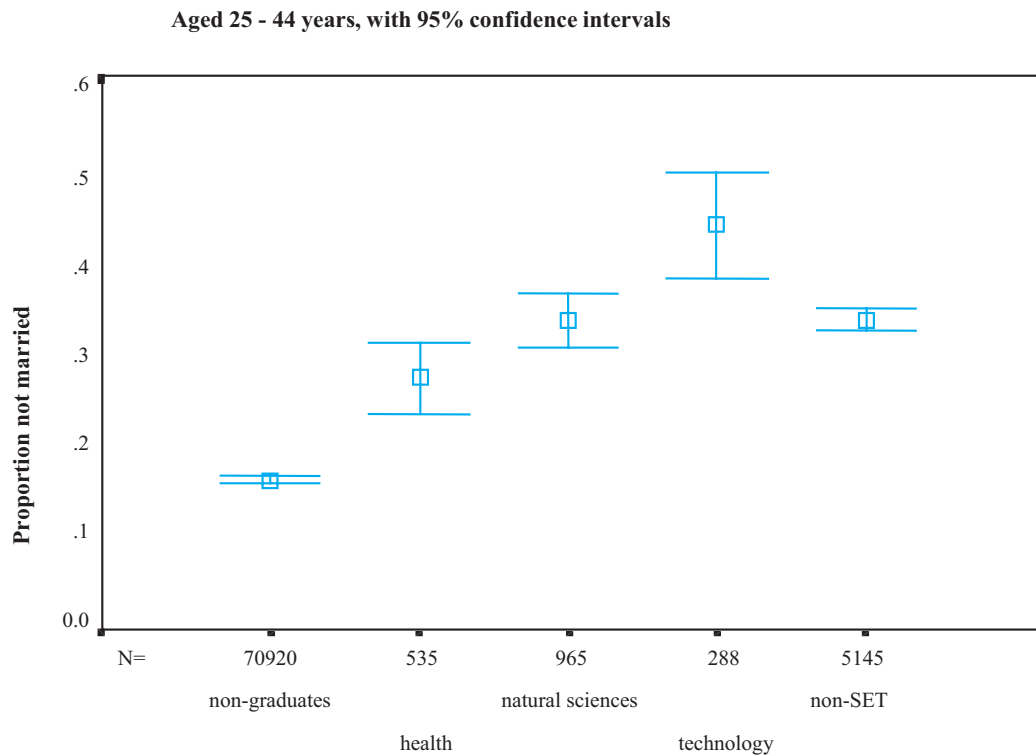
resulted in substantial human capital losses to industry, especially given the broader context of concern about the scientific 'brain drain' from Britain. Studies by McRae *et al* (1991) and Devine (1992) of highly qualified scientists found a consensus between employees and managers that childcare responsibilities were a major impediment to women's careers.

Although attempts to formalise recruitment procedures aimed to stop discrimination in recruitment, stereotypical assumptions were widespread, affecting not only working mothers, but also unmarried and childless women, because of their potential to become mothers. Some women felt that they were being unfairly denied the opportunity to prove they could fulfil the requirements of higher positions: promotion demanded a demonstrated willingness to sacrifice family life for the firm. Qualitative evidence that women perceived a trade-off between motherhood and professional life is supported by our

Table 4.2. 1991 employment destinations of scientific women aged 25-44 in 1991 who became mothers over the 1980s

1981 Occupations	1991 destinations		
	No.	In SET employment (%)	Not in employment (%)
Health	65	78	15
Science and Technology	72	31	40

Source: ONS Longitudinal Study.

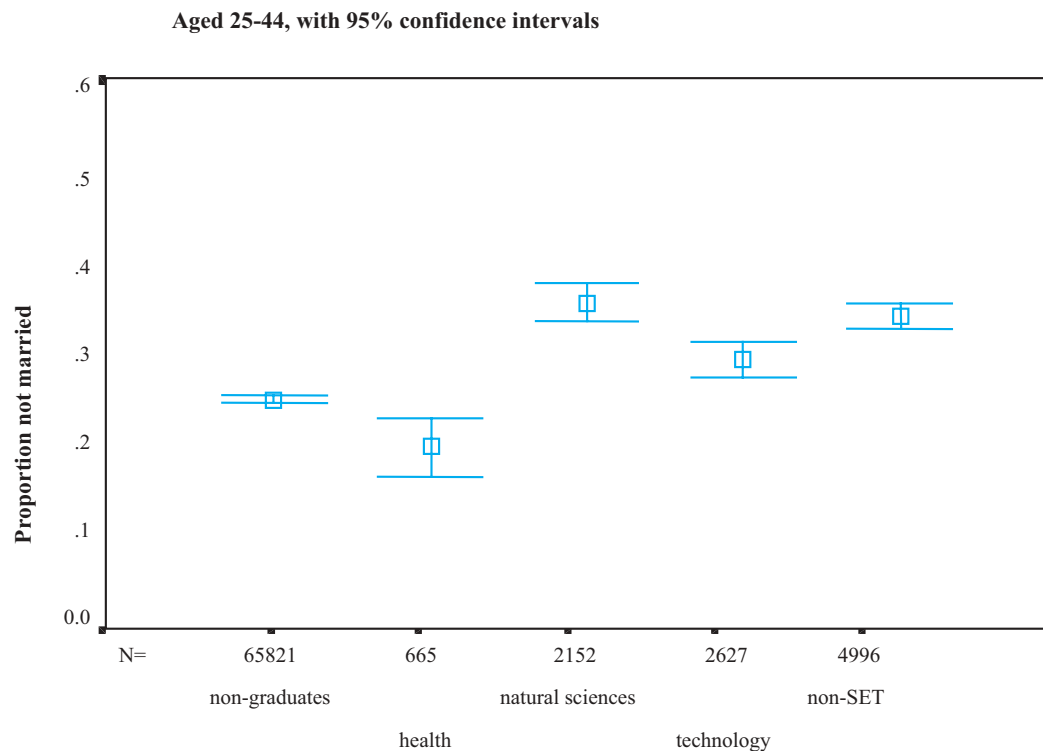
Figure 4.6 Never-married women, by subject

Source: ONS Longitudinal Survey.

findings. Figure 4.6 is concerned with the proportion of 1991 25-44 year old women who had never been married. Those with health-related qualifications are compared with the natural scientists (including those with qualifications in mathematics), the technologists, those with non-SET qualifications (degree level and above), and those with no degree-level qualification. The highly qualified were less likely to have married than those with no degree-level qualification. At the 5% level there is no significant difference in the nuptiality of those qualified in natural science, non-SET subjects and health. The technologists were more likely than other graduates to be single, and more than twice as likely as non-graduates never to have married. Among the highly qualified, those qualified in health-related subjects were the most likely group to have married. Taking cohabitation

into account makes the difference between the technologists and the natural scientists non-significant, but they continue to be twice as likely to be unpartnered than the non-graduates.

Figure 4.7 shows that there were more single men than women between the ages of 25 and 44 in 1991, though the patterns for men vary by qualification and are very different to those of similarly qualified women. Men with degree-level qualifications in health were more likely to have married than non-graduates. Those with technology qualifications were more likely to have married than either the natural scientists or the non-SET graduates: low nuptiality among those qualified in engineering therefore applies only to women.

Figure 4.7 Never-married men, by subject

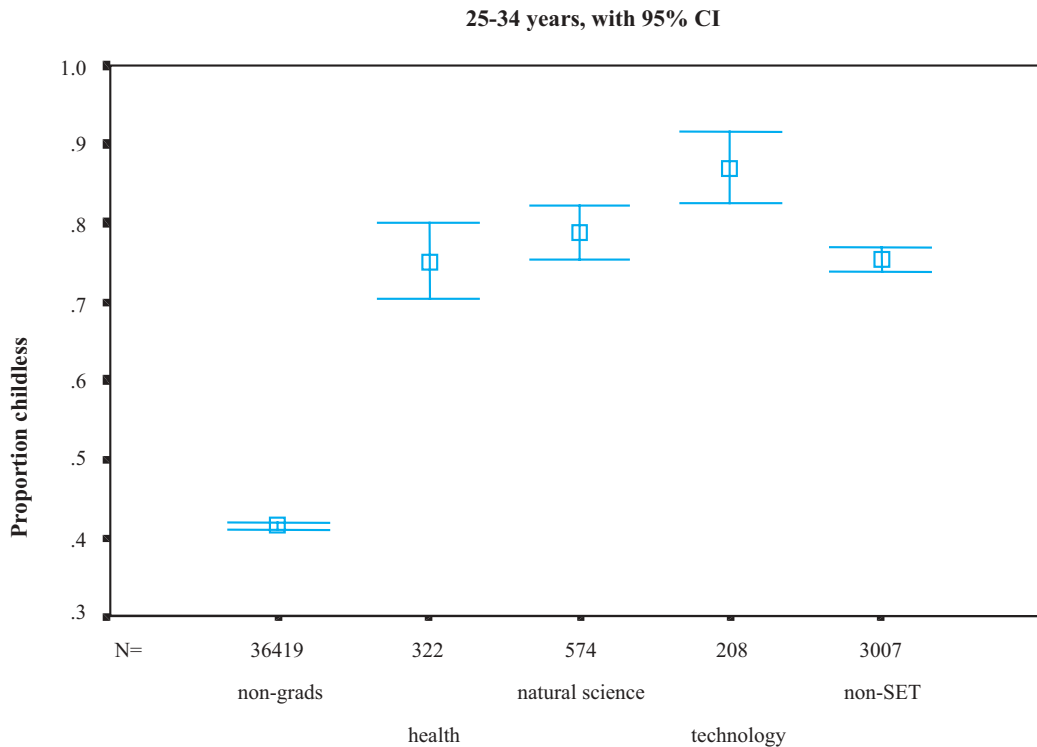
Source: ONS Longitudinal Survey.

Turning to childbearing, the qualifications of female LS members affected both the ages at which they became mothers and their chances of remaining childless. Figure 4.8 compares the rates of childlessness among 25-34 year olds with different types of degree-level qualification, and with non-graduates. Those qualified in technology were the most likely to be childless in this age range, and were twice as likely to be childless than women of the same age with no graduate-level qualifications.

These findings lend some support to the qualitative findings described above. However so far our focus has been on how qualifications affect family formation: now we turn to occupations.

Qualifications do not map neatly onto occupations, though this applies less to

those with qualifications in health-related subjects. To illustrate the propensities towards childbearing in different occupations, we compare the ages at which women entered motherhood through survival analysis. Here the 'hazard' that women are surviving is becoming a mother, calculated for each year between the ages of 15 and 49 years. These results must be interpreted with care, for the following reasons. Because of small numbers the analysis combines two cohorts, possibly with their own distinct childbearing histories. Also, we used birth data to 1998 only (later information is not available yet), when these cohorts were aged 32-51. Thus we only have largely 'complete' birth histories for those aged 41 and over in 1991. Although the statistical technique used takes account of incomplete childbearing histories, the information on childlessness

Figure 4.8 Childless women, 1991, by subject

Source: ONS Longitudinal Survey.

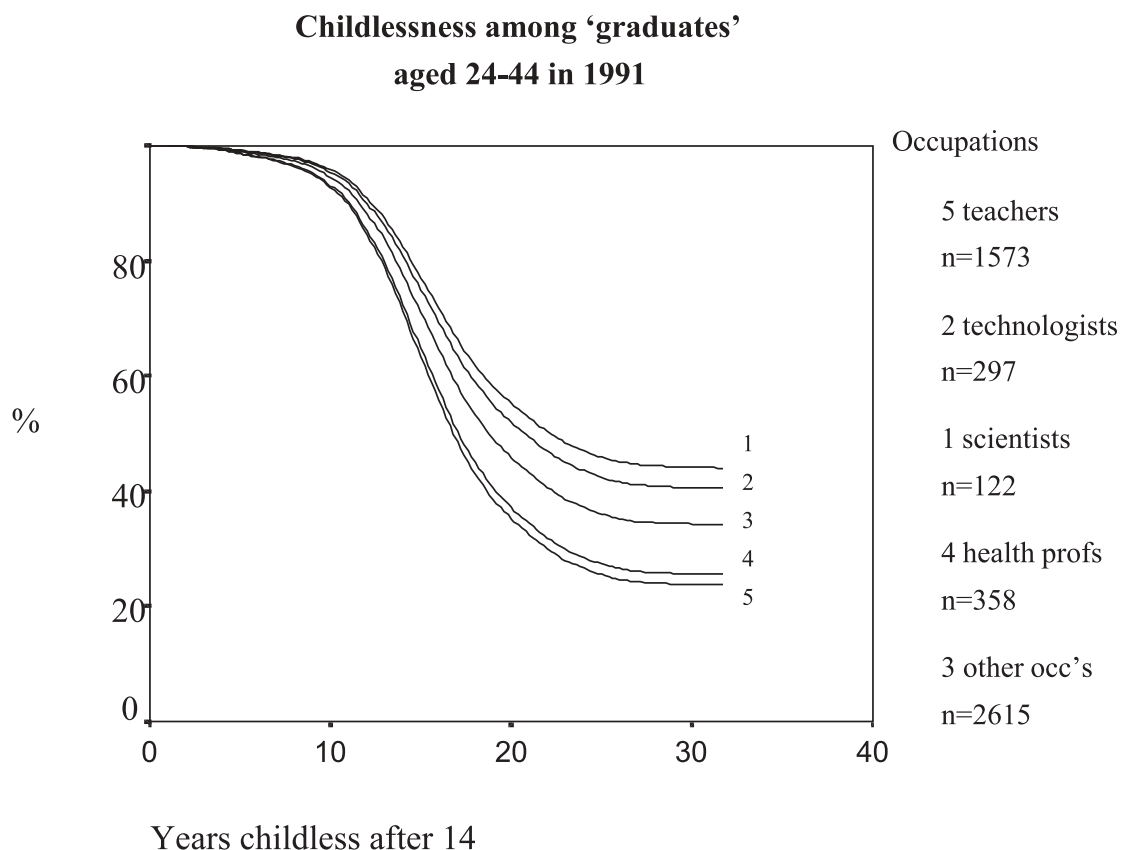
at older ages shown on the graphs describes more the experiences of women born earlier: more recent cohorts will probably have higher levels of childlessness. For this reason the graphs must be interpreted as summaries for comparing women with different qualification rather than as tools of prediction. Also our use of birth history means that those with children that they did not give birth to are counted as childfree. Despite these shortcomings, clear differences emerge between the different occupations. Figure 4.9 shows that those working in technology and in natural science were the least likely to have children. Those in teaching and health, both of which are widely acknowledged as 'child-friendly', were significantly more likely to be mothers than women in the other occupations.

The longitudinal evidence presented here shows that women's employment rates

generally and SET employment rates in particular increased among science and technology graduates between the early 1970s and 1990s. Most women and men with health-related degrees largely stayed in health occupations over childbearing and as they approached retirement, at which stages other SET graduates tended to leave SET employment. The 10-yearly intervals between major observations in the LS do not permit a detailed analysis of the relationship between employment and childbearing histories. However as far as we can tell, attrition from science and technology occupations intensified over childbearing. Women scientists who left SET employment often entered teaching, possibly as a way to combine family and professional life.

Those remaining in science and technology occupations have children later than other types of graduate, and their rates of

Figure 4.9 Childlessness among 'graduates'



childlessness are also higher. These distinctive patterns of family-building may reflect the influence of the institutional contexts that SET-qualified women study and work in, as suggested by the qualitative research. Women with degrees in SET, particularly the subjects where the representation of women is low, like mathematics, physics, engineering and technology, are exceptional. They survived the personal and social costs of atypical subject choices in education. It is plausible that they are more likely than other graduates to adjust their fertility behaviour rather than their career aspirations when confronted with employment practices that are incompatible with family life.

*Dr Margaret Blake
National Centre for Social Research*

Who applies for research funding?

I am going to be talking about the research project which the National Centre for Social Research carried out on behalf of the Wellcome Trust and the six Research Councils. My colleague Ivana La Valle at the National Centre and I worked on it together.

It is interesting that people have been discussing this morning the need for more research and more data. This is a survey that major funders of research have commissioned because they see the need for data on this. The survey originated from the realisation that women were obtaining fewer research grants than men. Research in Sweden had shown that there was discrimination in the allocation process. The Wellcome Trust and the Research Councils were concerned that that might be the case in the UK. They carried out internal analysis and assessment and found that, once women applied for grants, they were as successful in obtaining them as men. It was not the allocation process: women were applying for fewer grants. They commissioned this study to look at why women were applying for fewer research grants than men were. We were looking at men and women in the sciences and in the social sciences, which is broader than

academics in SET, because we were doing it on behalf of all the Research Councils.

The three key research questions we were looking at were:

- Why are women less likely to apply for research funding than men?
- What are the key factors that influence their propensity to apply and their ability to secure funding once they apply?
- What action can the funding bodies and higher education institutions take to ensure that women and men have equal access to funding opportunities?

Although the focus was on applications for funding, we have to look at many other things in order to understand the whole situation in which academics are working. The study is a very rich source of data only some of which I am going to present today. We looked at applications for grants, fellowships and also commissioned research. Today, I am going to focus on responsive mode grants.

We looked at people's perceptions of their eligibility to apply for grants and fellowships, the type of institution in which academics were working, the support available for them in making applications for funding, their employment circumstances, their position in the employment hierarchy, the type of contract they were on and whether they were full- or part-time. We asked about their personal career values and their strategies and how they approached their career and their responsibilities: how much they engaged in professional activities, their qualifications and their publication record. We looked at the home/work balance and what kind of domestic responsibilities people had and how these impinged on their careers.

We carried out a postal questionnaire survey between October 1999 and February 2000. We selected 54 institutions, 44 of

which agreed to take part and from those institutions we selected academics. The response rate was 40% but we had more women and more non-senior people responding, which probably reflects how important they thought the issues were. In the end we had 3,090 academics for analysis. All the results I am going to show you were weighted to take account of the fact that we over-sampled women in order to get enough for the analysis and that women were more likely to respond.

The first thing that we wanted to establish was whether women were less active in research than men and by this we were looking at their applications for grants. Looking at responsive mode grants, women were less likely to have applied than men in the last five years (50% of women and 59% of men). This confirms what the Research Councils and the Wellcome Trust had thought. We also found that women were just as likely as men to obtain at least half the grants they applied for (51% and 50% respectively). The problem is in women being less likely to apply, not in being less likely to obtain grants once they have made an application. We also looked at fellowships and, although the overall percentage applying for fellowships was much lower, there was no gender difference. If anything, women were slightly more likely to apply for fellowships than men (18% and 16% respectively in the last five years), and their success rate was similar or slightly higher than men.

We found that not only were women less likely to apply for grants, but the way in which they applied was different. They applied for different types of grants and to different bodies. So 43% of women and half of men had applied as a principal applicant. Women were more likely to apply as a co-applicant or as a co-author. Women were likely to apply for smaller sums of money (37% had applied for £100,000 or more, compared with 45% of men). This partly reflects the subjects on which women were

working: women were more likely to be in the social sciences where the value of grants are generally lower. Women were less likely to apply to the Wellcome Trust or the six Research Councils. Forty-one per cent of all respondents had applied to a body other than these; we were not expecting such a high percentage and we did not look in detail at these bodies. However, women were more likely to apply to these other bodies which generally gave out smaller grants.

Women were more likely to apply for shorter grants, for example, for periods of two years, while men were likely to apply for longer grants. Women were more likely to apply to have their salaries paid (30% compared with 20% of men) which reflects their position, given that research assistants and people lower in the employment hierarchy are more likely to have their salaries paid as part of a grant.

It is important to look at eligibility to apply for grants because not everyone is eligible to apply. All the funders of research have eligibility criteria; the most common are things like subject areas. Generally funders specialise in a particular area of research. There are also conditions on the type and length of contract. In some instances people cannot apply for grants unless they have a permanent contract. For other funding bodies people can only apply for grants for a shorter period than the length of their

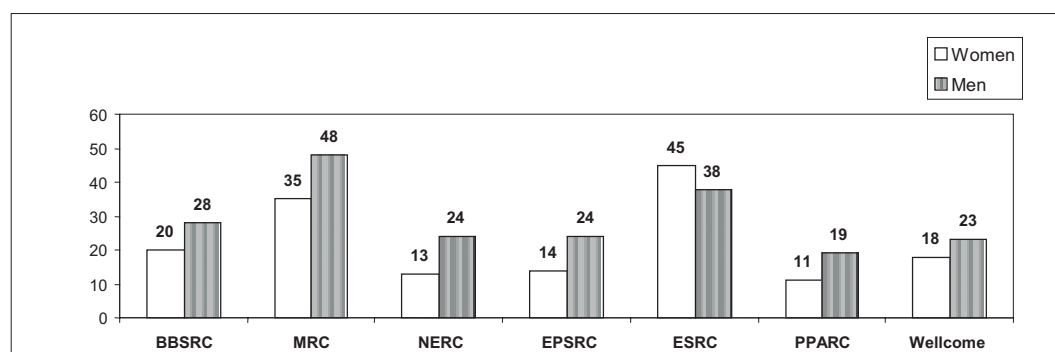
employment contract. For people on very short-term contracts it is difficult to apply for grants because the contract is less than the average length of a grant.

People whose salary is currently paid from an existing research grant are often not able to apply for grants from some of these bodies. Some stipulate that research assistants cannot apply. Unsurprisingly, women are over-represented among the groups who are not eligible to apply; they are more likely to be on short-term contracts, to have their salaries paid from a research grant, and to be in the lower grades of employment.

Figure 5.1 shows the percentage of people who are eligible to apply for each of the Research Councils and the Wellcome Trust. For all of them, except the ESRC which funds research in the social sciences, women were less likely to be eligible to apply than the men.

Apart from actual eligibility, what also matters is whether people *think* they are eligible to apply. If people are eligible to apply but they do not realise it, they still will not apply. So respondents were asked whether they thought they were eligible to apply to each of the sponsors of the study. This was compared with whether they were actually eligible according to the criteria set out by the Research Councils.

Figure 5.1 % eligible to apply to each funding body, by gender



Source  National Centre for Social Research

What we found was that the degree of mismatch varied. For some sponsors people were very aware they were able to apply, and for other sponsors, were less aware. But there was also a lack of understanding in that some people who were not eligible thought they *were* eligible. That was generally higher for the sponsors where workers were more likely to be aware of their eligibility. But for almost all of the sponsors the mismatch was greater for women than men; eligible women were less likely to be aware they were eligible than men. So not only were women less likely to be eligible but even if they *were* eligible they were less likely to be aware of their eligibility. People ask 'Well is this because women are not interested in applying for grants?' If you look only at women who actually want to apply for grants, or have applied in the past, you still see this pattern. You still see the pattern even among women who are research-active and want to apply for grants: there is still a lack of awareness of their eligibility.

We also looked at the type of institution academics work in. Once we had established that women were less likely to apply and it was not just due to their eligibility, we looked at the factors which might influence their ability to apply, such as type of institution and their position in the employment hierarchy. The institutions were divided into three groups. The main recipients are the institutions that are among the 25 top recipients of funding from the sponsors of our survey. The two other groups are the old universities and the new universities (the post-92 institutions). We

looked at the percentage of people from each of these institutions that had applied for a grant in the last five years. You can see (Table 5.1, below), that it varies very much by type of institution.

People in main recipient institutions were much more likely to have applied than people in the new universities. It is not just a tautology in that obviously the main recipients were more likely to have applied. You can see the same pattern for other old universities; academics in old universities as a whole were more likely to have applied. Looking at the outcome of their most recent application for a grant, you can see the success rate is much higher for other older universities and specifically for main recipient institutions. People were less likely to apply from new universities and, once they did, they were less likely to obtain a grant.

So one question is whether the gender differences in application behaviour are because women are in different types of institutions. But we found that, when you control for the type of institution, in each type of institution women were less likely to apply than men. So, in the main institutions 60% of women compared to 70% of men had applied in the last five years. You can see a similar pattern that is most extreme in the new universities (29% of women and 41% of men).

We also looked at the support to which people had access in applying for grants. We looked at various types of support that people might need, such as contacts with

Table 5.1 % of academics that applied for and obtained research grants by type of institution

Type of institution	Applied in last five years %	Obtained (most recent) %
Main recipient	67	63
Other old university	62	55
New university/ HE college	39	37

other academics, availability of funding, the support from the department in making applications, and constructive feedback they had received from previous applications. We also asked them how important they thought these were in making grant applications and we created an index based on the importance of these different factors and whether people reported that they had had that kind of support. We categorised people into receiving high, medium and low levels of support.

We found that in the old universities, people were more likely to report having had high levels of support for their grant applications than in the new universities (34% and 20% respectively). In each type of institution women reported lower levels of support than men. I should point out that this is their *reported levels* of support; it is not necessarily *actual* support. Of those we categorised as having high levels of support, 89% had applied for grants in the last five years compared to 54% of those with low levels of support. Interestingly, among those with high levels of support, women were as likely to have applied for grants as men (91% compared with 88% of men). Among those with lower levels of support, women were less likely to apply than men. So, women were less likely to have these high levels of support but, once they had, they were as likely as men to apply for grants.

We also looked at gender differences in employment patterns and found patterns that will not be surprising to most people. Women were less likely to be in senior posts, they were more likely to have a fixed-term contract, they were more likely than men to work part-time, they were more likely to have had a career break, and they were more likely to have worked outside higher education or research before taking up their current posts.

If we look at the extent to which

employment circumstances affect application behaviour we find that senior academics were more likely to have applied for grants in the last five years than others (87%). Those on a fixed-term contract were less likely to have applied (52% compared with 59% of those on a permanent contract). Part-time staff were less likely than their full-time colleagues to have applied (37%), those who took career breaks were relatively unlikely to have applied (34%), and people who had worked in the past outside higher education or research were also less likely to have applied (42%). Women are therefore over-represented in the groups who were less likely to apply. In part, the gender differences are explained by women's different position in higher education employment.

The picture is quite complex and, in some cases, if you take account of women's position, the gender differences in grant application behaviour disappear. In others, even if you take account of women's different positions, they are still less likely to have applied. For example, looking at those on fixed-term contracts, 53% of men compared to 47% of women had applied. When you look at part-time staff there is no difference between men and women, although the numbers are quite small, so we need to be careful when looking at these groups.

We looked at people's professional profiles. This was mainly their publication record, their involvement in activities with a high visibility, such as presenting at conferences, being on steering groups and assessment boards for higher education, and so on. Again we ranked people's publications and their involvement in these activities and gave them a score according to their involvement. We categorised people as high, medium or low. Those with a high publication record who were more involved in professional activities and who had a PhD were more likely to apply than those with fewer publications and who do not

have a PhD. Ninety per cent of those with a high publication record had applied compared with 33% of those with a low record and 92% of those with high visibility had applied for a grant compared with 43% of those with low visibility. Women were less likely than men to be in the high profile groups and more likely to be in the low profile groups. As we found for the level of support they said they received, once women were in these high profile groups they were as likely as men to apply for grants. Among the lower profile groups, however, the gender differences remained.

My following points relate to what Louisa was talking about: the balance between home and work and how that affects grant application behaviour. We found that women were less likely than men to be in a relationship and have children and this persisted in all age groups; it was not just the differing age pattern. Despite this, they were more likely than the men to have domestic and caring responsibilities. They were more likely to say that the need to compromise in a dual career couple had been a problem. But, interestingly, men and women were equally likely to say they had difficulties in combining work and family. So the perception of there being a home/work balance issue was expressed by both genders, but in practical terms women had more responsibilities and more practical problems.

We also looked at access to family-friendly arrangements in different institutions: both what people said was available to them and what they actually used. We found a mixed picture in that in some ways a higher education career seemed to offer quite flexible, family-friendly arrangements. People were quite likely to report that they could work at home. Forty-five per cent reported that there was a work-place crèche available. Both of those were much higher than in other occupations. On the other hand, reporting of paid and unpaid maternity leave and other types of family-

friendly arrangements was quite low. Again, we created an index that looked at whether people reported good, moderate, or bad access to family-friendly arrangements. In the main, we found that funding recipient institutions the provision of good or moderate access was much lower than in the new universities (54% compared with 67% in new universities). This raises interesting questions in that grant applications were higher in the main funding institutions. So it is not clear that lack of good, family-friendly arrangements is preventing applications for grants, but there is something complicated going on that needs to be looked at.

I am briefly going to look at the implications of this research. We looked at two types: the implications for the funding bodies who funded the research and the implications for higher education institutions. We looked at the latter because many of the findings suggested change was needed in higher education institutions rather than in the funding bodies.

In certain subjects within SET more funding for female postgraduate students would encourage women to continue in science beyond undergraduate degrees. Another implication is the need to take a look at the grant funding allocation policy. Women are not overtly discriminated against but implicitly they are by the eligibility criteria; they are over-represented in the groups that are not eligible to apply. Funding policies should encourage or provide more funding for junior or new entrants to academia and part-time workers. Funding should be flexibly allocated so that it takes account of different working practices. We found that women were less likely to be aware of their eligibility and seemed to be less involved in informal networks through which people would find out about funding. So there is a need for more formal dissemination about funding so that it does not rely on meeting the right person at the right time.

There may also be scope for influencing higher education employment practices in that the main institutions rely very heavily on funding from the sponsors of our study. The funders therefore have leverage in influencing employment practices. There is also the need for monitoring the gender distribution of funding income and seeing how things change. If improvements are made they can be assessed and the information can be shared so that good practice can be extended.

For the institutions we identified a need for more structured and transparent career development opportunities. People could then develop their careers and see what determines promotion. Career progression would then be less dependent on personal networks and people's particular situations. Mentoring schemes which exist in many institutions could be extended as a way of encouraging people to apply for grants, knowing what was available and providing support for that. Generally there is more need for information and support for funding applications so that people know what they can apply for and how to apply. There is also a need to address the home/work balance.

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Recent research on women in the academy

At the risk of being profoundly superficial, I am going to attempt to give an overview today of some of the key issues that seem to be emerging in terms of research on women in the academy. You will notice that we have had a lot of talk this morning about 'exclusion' and 'inclusion'. There is also all the data collected on the gendered division of labour and a subsidiary concern about the emotional labour and the psychic economy of organisations. I will go into these in a little bit more detail.

The power/knowledge conjunction has been very heavily theorised by post-modernists, post-structuralists, feminists, etc. It is an interesting contradiction to some of the discussions about access because it is actually looking at what are we accessing in the academy. Then there is the very rich area of organisational culture. There is the work that I have been doing on micropolitics that seems to suggest that power gets relayed in everyday practices. It is not all just about promotions and grant applications, but it is about how gendered power operates in the quotidian.

Then there is the whole area of access, equal opportunities, transformation, redistribution

and you will notice that there has been some slippage over the decades. The terminology has changed, the packages, the policies change, and in different national locations there are different ways of classifying these interventions. Then you had a wonderful paper before the break about women and research and knowledge production, and that has been an area of concern for quite a while, and I will look at that in more detail in a moment.

More recently there have been some very interesting studies about women in management in general, about women's position in relation to new managerialism and organisational change. An area of work that I am particularly interested in is about the gendered nature of quality assurance in higher education. I am currently undertaking research on that.

Let's look at the inclusions/exclusions. Traditionally, women's relationships to the academy have been characterised by exclusions and very elaborate mythologies to justify exclusions. If you look at the work by Carol Dyhouse, who is a historian, she did a wonderful study, going into archives all over the country, looking at some of the rationales that were used to keep women out and some of the struggles that women had to enter the academy (Dyhouse, 1995). It has only been in the last century that women have actually been allowed in, and then not to all disciplinary areas. It was a long, long struggle: if you think of how long the university has been in existence, and how recently women's inclusion has been, you will see that it is a fairly short space of time we are talking about.

Some of the mythologies that have been used are applied in terms of Cartesian dualisms: women are associated with the life of the body, with the emotions, and men with the life of the mind. If you read some of Dyhouse's studies they will tell you about the stories and the threats and the dangers and the fears that were perpetuated about

women crossing that boundary, crossing that divide. There were all sorts of myths that this would disrupt women's reproductive function, for example. Women should concern themselves with the reproduction of the species and intellectual work was thought to disrupt the menstrual cycle, women would grow hair all over their faces, etc. These were some of the elaborate, pseudo-scientific explanations that Carole Dyhouse talked about. Valerie Walkerdine and others have also theorised women's relationships to maths in terms of school and how women have traditionally been positioned as incapable of rational thinking, of being positioned as illogical, changeable, transmutable, etc. (see, for example, Walkerdine, 1998).

Then you have a whole range of explanatory frameworks as to why women have been under-represented. You have the one that we hear all the time: 'domestic responsibilities'. One of my concerns about that is that it just positions women in a very kind of normed relationship in terms of the family. It assumes that women have 100% domestic responsibility; it assumes that all women have a commonality of lifestyle, etc. It is increasingly becoming less satisfactory as an explanation.

Then there are all the concerns about structural discrimination. We hear a lot, for example, in the police force at the moment about institutionalised racism. Feminist research has been talking a long time about institutionalised sexism in higher education. It is embedded in the structures, the attitudes, the belief systems, the values, and so on. So it is not all about women having to rush off home, cook dinners, pick up children, etc. There are major external barriers.

We heard this morning how women are often analysed in terms of narrative of 'lack', 'deficit': the remediation ethos; there is something wrong with women, you have

got to work on them. If you think back to some of the really exciting projects like, for example, Opportunity 2000 - I did some work for them over a decade ago - much of their emphasis was to go and work with groups of women and to empower women and train them to be more assertive, to be more confident, etc. Although there was tremendous value in women's organisations, meeting and sharing experience, etc., there was an underlying view that women were the site to be worked on - not the organisation - and that all women had to do was present themselves differently, package themselves differently, and so on. The lack of mobility is one that you hear again and again and again: that you don't need to promote women, that they will stay and that they will work hard anyway, because they can't escape. They all have these very fixed relationships and domestic responsibilities that they can't easily escape from and go to the other side of the globe.

Then there is a whole area, which I find extremely interesting, and that is the notion of psychic narratives. Now this is packaged up in terms of - sometimes you hear - self-confidence, sometimes you hear self-esteem, self-efficacy, sense of worth, etc. But what I found from a lot of my research is that there are structural, external, very obvious barriers. There are also abstract, nebulous, quixotic barriers, and then there are quite potent intra-personal processes going on with women. For example, thinking that there is no point in applying for a research grant, for promotion, because they won't get it anyway. So there is a complex coagulation, I am finding, of factors that would account for women's under-representation in senior posts.

Then there is the gendered division of labour. Well, I think we are all familiar with the statistics by now in terms of horizontal segregation. Certainly you can play around with the figures, you can put them into percentages, and you can put them in actual

numbers. As *The Guardian* wrote recently: if you are a woman you are 550% times less likely to be a professor than a man! Although there appears to be a very rational, overt agenda for promotion - overt criteria - when publications, conference papers etc., are actually counted, women have to have published two and a half times more on average than men. So something is going on. I am doing work at the moment on Commonwealth Universities and currently there is a lot of talk about globalisation. It has become *the* dominant concept in the social sciences, and I am just wondering if we have managed to globalise gender inequality as well. If you look at some statistics from across the globe you will see that there are tremendous similarities and I know that Liisa is going to look at Europe afterwards. Even countries with very elaborate, very sophisticated policies for equality, etc., still have a very low representation of women in senior posts.

A key point that is coming up from the research is that women are entering the academy as consumers of the higher education product. In Britain we have over 50% undergraduate women students. They are dropping off as it gets higher: if you look at postgraduate work it drops to 30%, and then as you get to doctoral level it becomes even lower. So they are entering as consumers, but not, it would seem, as producers.

There are lots of different explanations. Why is this happening? One that I thought was particularly interesting - it is not recent, it is 1985 - but one that has helped to analyse a lot of data that I have come across and that is Peggy McIntosh's theory of 'Feeling Like a Fraud' (McIntosh, 1985). We had a lot of talk about women making themselves visible, about taking the podium, about claiming authority, and Peggy McIntosh's research said that people from lower status social groups, whether it is working-class, black, women, etc., tend to have some

anxiety about making themselves visible in relation to claiming authority. There is this very powerful narrative constantly running saying, 'I am going to be found out!'; 'They are going to find out sometime that I am a fraud!' This often holds women back in the workplace - not just in the academy, but elsewhere in the workplace. Also we are finding from work in the Commonwealth that you become very visible if you become a successful woman in the academy. People watch you and they notice you, and you can't put a step wrong. So it is almost kind of an 'original sin' here - to use a metaphor from Christianity - that you have got all this very powerful social construction of women lacking and being in deficit and having to prove themselves all the time. It often works, I am finding in my research, in terms of overwork and a lot of endeavour to demonstrate value, etc. Always there is this narrative kind of dogging members of lower status groups that they are not real academics, they are not real doctors or whatever the professional status may be.

The organisational culture is something that comes up again and again in research, and people like Celia Davies and Penny Holloway in Britain have deconstructed organisations to look at how the myths, the symbols, the language, the values, the dress code, etc., subtly perpetuate gendered relations of power (Davies and Holloway, 1995).

Then of course there are responsibilities in the private domain, and again you don't have to be married or be a mother to have responsibilities in the private domain. That is something that is often overlooked.

There is an area that is coming up a lot in recent research, particularly in relation to massification in higher education to change the constituency. We will talk a little about access in a moment. Increasingly there are people coming into the academy who have very potent psychic narratives of lack and deficit and need a lot of emotional support.

People like Malina and Maslin-Prothero (1998) have written about this, where they say that there is kind of psychic economy involved in massification; that a lot of the extra support that is given to new constituencies tends to be highly gendered and it really doesn't count very much in terms of promotion. If you put on your application how many people you've counselled that week I don't think it will get you very far.

Dangers of visibility. In some of the work that we have been doing in the Commonwealth, many of the researchers there are saying that it is better not to be a high-profile woman in the university: people immediately make very negative assumptions about you. They think you are there because you have had a relationship with a senior man. They think you are there because you have a contact, potent network, etc., but they won't ever think you are there in relation to your own merit. So you actually make yourself very visible and very vulnerable as soon as you have a high profile. There is some very interesting research in Canada looking at women and silence in education, in terms of schools. There is a very important message given to young girls as they are being socialised to be very careful, not to draw attention to themselves, to try to avoid eye contact, not to draw attention to their bodies, to avoid violence. We have heard the countless reported cases about victims of rape being told that it was their fault because they wore the wrong thing, or they were out too late, etc. So you have all this going on in wider society, and then we are saying to girls and to women, 'OK make yourself visible, draw attention to yourself, claim authority, be confident', etc., and there is a contradiction there.

More and more work is being done on greedy organisations and emotional labour. Boundaries are getting more and more fluid. It is more difficult with multi-skilling, which is now a very important part of

academic employment regimes. Now fewer people have to do more and more and a tremendous range of flexible work is expected. It is getting ever more difficult and more unsafe, as we have heard from some of the studies done on academic tenure, to draw up boundaries. Certainly women I am interviewing on quality assurance are saying with the new consumer culture, the culture of entitlement, that it is very dangerous to stake out boundaries. Increasingly, you have to be accessible to everybody all of the time, otherwise there will be a grievance procedure in your direction!

Moving on to the power/knowledge conjunction, this has been very heavily theorised, but you wouldn't think that if you saw current government policy. A lot of the work that has been done by feminist researchers seems to have been completely overlooked in, say, some of the work on access and enhancing participation. So, current policies are about 'packing them in', numerical change, and quantitative change. It is not about the actual product, the gendered nature of the product that is being accessed. What is taught in universities, and what gets disqualified? Liz Stanley has been writing about this for decades (see, for example Stanley, 1997). What are we bringing people into? Judith, this morning, asked are we being irresponsible by pushing girls into disciplinary areas and professions that are hostile to them?

Another area is how knowledge is produced and transmitted; the methodologies for research and pedagogies. Now there is a lot of talk at the moment throughout the academy about best practice, teaching and learning, the Institute for Learning and Teaching, the QAA; notions of what constitutes really effective teaching and learning. What is interesting is that a lot of their suggestions have been completely appropriated from feminists, Marxist critical pedagogues, and the politics have been edited out altogether.

So we have lots of discussion now about group work, experiential learning, but no acknowledgement of the work that has been done for a very long time on women learners – work, for example, on feminists' pedagogies or bell hooks (hooks, 1995). Then there is the consideration of the formation and governments of universities: is there something embedded in the structure of universities that is profoundly gendered?

An area I find extremely interesting is the area of micropolitics and this suggests that gender gets relayed in informal spaces. In my book *Organising Feminisms* (Morley, 1999), I interviewed women in Britain, Sweden and Greece and asked them to give gendered analyses of their work places. While many were very concerned about low promotion rates, etc., that didn't seem to wear them down as much as the day-to-day struggles. The daily struggles were nebulous, quixotic, very difficult to capture, and extremely difficult to mobilise around because you were never entirely sure of your readings of the situation. You can feel a kind of barbed comment, you can feel put down, and excluded, but if you were to take that to a third party you would sound trivial, small-minded, etc. So gendered power gets relayed in a whole range of different informal practices, for example, rumour, gossip, sarcasm, humour, denial, throw-away remarks, alliance building. Then it gets encoded in the organisational culture: images, metaphors, artefacts, beliefs, values, norms, rituals, language, stories, legends, myths and other symbolic constructs. So it is everywhere; it is not just in the numerical representation of women.

Then there are different models for gendered change. The terms differ according to where you are and what particular point you are at - affirmative action in the States - that used to be equal opportunities in Britain, but it is much more likely to be social inclusion now, and access, which is now a dominant policy discourse

in Britain. What the critics are saying about access is that you change the constituency of the consumers - it is a small expansion of groups, of numbers, of under-represented groups. It is this belief that what is being transmitted is universal; that it's value-free. There is a lack of intertextuality between that and all the research that has been done by feminist academics, for example Ros Edwards's study on mature women students (Edwards, 1993). I went to a presentation recently on HEFCE's policy on enhancing participation and there was no reference made to the countless studies that have been done about bringing new constituencies in, the difficulties that are faced, etc. So what changes with the access agenda? Well, the numbers change but the different forms of knowledge that groups bring - women or working class students, etc., - are not necessarily given epistemic privilege. Certainly some of the early studies, like that of Ros Edwards', found that new constituencies had to separate their academic life from their cultural life completely. They had to make all the adaptations for change and the organisations stayed more or less the same. Power does not get challenged and you get very limited transformations. So you might get some extra student support services, for example, but that is about it.

The point was made earlier today that in most of the research on higher education only women are gendered; women are the problem, women are the remedial group. There is very little about men or masculinities, and that is in stark contrast to the work being done in schools looking at how masculinity is socially constructed. That is not problematised in higher education.

What is interesting is how norms are embedded in so much of the research, the language, even in the fabulous presentation this morning we talked about women being 'childless' and 'unmarried' so the norm is to have children and to be married. I was

wanting to say, 'No, child-free and single!' to try and change it a little bit.

If you look at Coffield and Vignoles' very influential report to the Dearing Committee of Enquiry (Coffield and Vignoles, 1997), consider the title of it: 'Widening Participation: Higher Education for Ethnic Minorities, Women and Alternative Students' - all the 'other' lumped into one category! What comes up again and again is that alternative students are constantly made to feel 'other'. Nancy Fraser, who hasn't specifically written about higher education, but has written about affirmative action policies, asks whether all these policies for change are about recognition, recognising difference, or whether they are about redistribution (Fraser, 1997).

So the key question is what is changing in the academy? Is it having any material effect on the redistribution of rights, material benefits etc., beyond the academy? Are we getting into the situation where - as Bourdieu or Dale Spender would say - that whatever less powerful people manage to access immediately loses its value as soon as a low status group gets hold of it; the 'badges of distinction' argument. So if you think about it, in some national locations, higher education is becoming more and more female-orientated like in the Caribbean. Iran has more women undergraduates than male undergraduates, but women can still be breaking the law if they wear lipstick in public. So what is the actual change in composition? What impact is that actually having in terms of women's rights? This is really what Nancy Fraser is talking about: are the changes within organisations accompanied by a redistribution of power and material resources?

This morning we have had a lot on this on women and research, and I will just summarise. Diane Reay has talked about women's adjunct roles in organisations (Reay, 2000), and this is happening very

much in women and research and what I am finding - what I have found in the past - is that this 'success breeds success' translates into - if you are unknown - and reads as you are unknowing. So women get caught in a relationship where they constantly have to partner up with the big names and that means that they are constantly the small names. Recent research has shown (albeit without reference to gender) that there are new reward systems in place for people who shoulder the burden of the day-to-day work in order to free-up the space for the superstars. What I am finding in my work on quality is that it is profoundly gendered.

Women in management. A lot has been written about this - Rosemary Deem and Jennifer Ozga's project on new managerialism is very interesting (Deem and Ozga, 2000). Some of the early research on women generally in management, but more specifically in higher education, was very essentialised. It took sophisticated, carefully honed interpersonal skills and said that they were women's natural propensity - to nurture and to relate. It completely deprofessionalised all the work that women had done to develop those skills. Particularly in some of the work we are looking at in the Commonwealth, there is *still* this essentialised notion that women make better managers because they have better relationship skills. Some of the issues that are being raised by people like Deem and Ozga, etc., are that new managerialism reinforces macho styles of management. All this is very outcome-orientated, with emphasis on targets, performance measurement. There is a lot of militaristic imagery that is used in management nowadays about bullets, targets, game-plans, etc. They are asking is it actually ignoring all the kind of more process-orientated aspects to managing change.

Something that I have written about and talked about is the equity paradox: that just as people decode the system and access it,

it loses its value. But it is also interesting that New Right legislation for change in higher education has achieved a much bigger demographic shift than decades of equity legislation! So again, it is another paradox: by abolishing the binary divide and changing access policy, more under-represented groups got in under New Right policies than under decades of equal opportunities ones! But the question really is: have equity issues gone off the agenda now? Is it all about quality not equality? Has, once again, the producer and consumer of higher education, become a universal, disembodied subject?

And then, big questions about can women make a difference in management? Do they always get incorporated into existing regimes of power? And you could ask why should they make a difference? We don't expect every male manager to carry the burden of every male member of the organisation. But certainly some of the people I have interviewed for my research are terribly angry that if women have got into senior positions they haven't done anything for all the other women in the organisation. So they are being 'responsibilised'. Also, it is often assumed that - again essentialising and using the critical mass notion - that all women are gender-sensitive. The belief is that, if you get more women into positions of power, the organisation becomes more gender aware. Well we know that is just not the case in many places. Why should it be any different for women?

An area that I am working on at the moment is quality assurance. As you all know it is a major regime of power in the academy, and as with all regimes of power, it has both creative and oppressive potential. What I am finding from women that I am interviewing is that, on the one hand they are being left to do all the organisational housework around teaching and learning, but on the other hand it is opening up new opportunities and career paths. So they are

getting promoted, they are enhancing their mobility, enhancing their visibility, their organisational skills are getting rewarded, etc. But there is a real danger there - linking it into the Wellcome Report today - that women are getting diverted away from research activities and are getting more and more fixed and stuck in all the areas that other people don't particularly want to do in the academy.

So to finish, there are silences obviously and I am sure you will say, oh well, if you'd have read my report you wouldn't see it as a silence, but this is what I have come up with. Only women are gendered in higher education research on women. There is little problematisation of men and masculinities. Gender differences get frequently essentialised.

There is a lack of qualitative data. We have a lot of quantitative data, and I am not belittling that. If you think back to 1989 when the first major publicity on statistics of women professors came out, at that point they were 3%. Within a year, it had gone up to 4.9%. So there was something about the naming and shaming involved. Obviously quantitative research can be used to effect change. But there is very little about organisational culture and the complex relays of power. There is very limited research on intersections with other forms of inequality; often social class can offer much more explanatory power in certain situations than if you just look at gender.

The purpose of the university. Those of you who are from higher education studies will see that there are constant universals being discussed: the Quality Assurance Agency talks about 'the student experience'. It homogenises students, it uses the definite article, and it has 'The Learning Society'. It is as if everybody has a sort of shared agenda, a common consensus. It doesn't recognise conflict, it doesn't recognise diversity. In the recent HEFCE consultation

document on diversity I thought that it was going to be all about different social groups. But diversity was being conceptualised in terms of different modes of provision in different organisations, not in terms of considering the consumer group. And then you tend to get quantitative representation and the access agenda and the 'counting women in', lifting the wire, letting a few more in. But we don't actually change the product.

A big issue is, if you go back to Dale Spender, that 'where women are, the power is not'. Have we sufficiently theorised, predicted and pre-empted this notion that if any area gets a lot of women involved it loses status because you have an intersection of the status of the discipline of the organisation with the cultural construction of women? You get very normalised, discursive framings of women in relation to the construction of traditional families. It is assumed that women all have a shared lifestyle and we know that that is changing. One in five women remain childfree, and yet we still keep being told about women's childcare responsibilities as an explanatory framework. And then there is this lack of intertextuality between the research that has been done for several decades now on women in the academy and what is happening in terms of policies. Certainly some of the areas have been appropriated, they have been rearticulated, but they have been divorced of their political underpinnings.

So just to finish really, what's changing in higher education? Is it having an impact on wider society and is the change sustainable?

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Women in higher education:

a European perspective

I am going to introduce European perspectives on the topics we have been discussing today. Currently within Europe the issue of women in higher education and women in science seems to be very strong on the agenda. In addition to this conference I have information on at least four large international events throughout Europe taking place this autumn: a conference on the role of women in higher education in St. Petersburg, Russia; a European science foundation conference in Italy, where social psychologists and policy-makers are discussing various issues concerning women's scientific careers; the European Commission conference on gender and research in Brussels in November; and a conference on women in the life sciences in Stockholm, Sweden in the Karolinska Institute¹¹. In March 2002 a large Mediterranean conference on this topic will take place in Grenoble. On a smaller scale, the Finnish Association of Science Studies is organising a seminar on gender perspectives in science studies in Helsinki, Finland in mid-November.

¹¹For a video of the conference see: http://info.ki.se/news/items/tools_for_successful_careers_en.html.

What is noteworthy is that a number of these events are taking place in Eastern and Southern Europe, where activism of this kind has not been very notable for a long time. I'm also involved in co-ordinating the European Network for Gender Equality in Higher Education, and its e-mail network EQ-UNI. This network brings together around 300 researchers, teachers, administrators and gender equality advisors from 30 countries and five continents. The network has held two conferences, the first one in 1998 in Helsinki, Finland and the second one in 2000 in Zürich, Switzerland. The next conference will be held in Genova, Italy in September 2002. The EU initiatives have already been mentioned. It is easy to access information on the EU initiatives through the Cordis website¹². Women and Science activities in the EU have been progressing very rapidly since the late 1990s.

My presentation here is based on recent research and co-operation I have been involved with in the 1980s and 1990s. I am talking on a macro level; I am not going to be science- and technology-specific, but will focus more broadly on academia and academic research. Finally, I will present some results from my PhD *Sexism, Survival and Support in Academia* (Husu, 2001b), a qualitative study on gender discrimination experiences of academic women in Finland. I would also like to draw your attention to two relevant recent publications related to our theme today, a book *Hard Work in the Academy. Research and interventions on gender inequalities in Higher Education* (Fogelberg et al, 1999), an edited selection of presentations of the First European Conference on Gender Equality in Higher Education (Helsinki, 1998), and a special issue on gender and academe (Vol. XXV: 2, 2000) of the UNESCO/CEPES journal *Higher Education in Europe*, edited by Louise Morley and myself. Both include a wealth of information on what is happening in the field of gender equality in academia in Eastern and Western European countries.

So why is Europe interesting in this respect? Firstly, Europe can be considered as an interesting 'laboratory' to look at the conditions of women in higher education. There is great variation in Europe when it comes to the proportion of women in higher education, but European countries also vary in other relevant aspects. Great variations exist in the history of women's employment and education within Europe and these should be taken into account when comparing the current situation in these countries. For example, Finland, where women's educational level and proportion of women of the professoriate are currently very high compared with the rest of Europe, had proportionally more female students in universities in the early part of the 20th century than any other European country. After the Second World War, the proportion of female students was 15-30% in most developed countries, whereas in Finland it was over 40% (Hobsbawm, 1994).

Women's labour market position in society more generally is crucial to consider when analysing and comparing the position of women in higher education and science in different European countries. There is great variation in Europe in terms of women's labour force participation rate from under 40% in Italy and Spain to 72% in Denmark. Also full-time and part-time participation rates vary enormously; a third of all women in EU countries work part-time, but part-time rates are relatively low in the Mediterranean countries and Finland and very high (70%) in the Netherlands. In the Nordic region - Denmark, Finland Norway and Sweden - women's labour force participation rates are the highest in Europe, rising from 65% to 72% in 1999. However, it is only in Finland that women have traditionally been employed mostly full-time. The UK has similar overall employment rates to Finland with 64%

¹²www.cordis.lu/improving/src/hp_women.htm.

participation rate in 1999. However, 40% of women in the UK work part-time. These kinds of employment patterns are important to take into account when comparing women's participation in academia.

Childcare provision in Europe varies enormously. In the UK and Germany publicly-funded childcare has not been developed to a large extent, whereas in the Nordic countries and France childcare provision has been brought onto the public agenda much more thoroughly. There is also great variation in how gender equality issues are placed on the political agenda in the European countries, both in terms of ideology and legislation. Levels of positive action to promote gender equality vary also markedly from country to country (Fogelberg *et al*, 1999).

What indicators can be used to compare European countries when it comes to the position of women in higher education and science? Eurostat has recently published new information on tertiary education levels in the EU. In most EU countries more women than men are now educated to tertiary level. In 12 out of 15 EU countries (figures from 1998-1999) women represent the majority of university (and equivalent) students. The number of women in tertiary level education is also increasing at a faster rate than that of men throughout the EU. However, what is noteworthy as regards careers in scientific research is that women tend to participate more in university programmes with practical/technical/occupational orientations than men and less in theoretically-based or research-preparatory programmes that would give access to professions with high skill requirements. When looking at the educational levels of the working age population, Finland and Sweden topped the EU list in tertiary level qualifications for people aged 25-64 (31% and 29% respectively). The lowest proportion of tertiary level qualifications are in Italy and

Portugal (both 10%) and in Austria it is only 11%. The proportion of tertiary level qualifications was slightly higher among men than women on average in the EU (22% and 19% respectively). The gender difference in favour of men was notable in Germany (men 28%, women 18% holding degrees), whereas in Finland, 34% of women aged 25-64 had tertiary degree qualifications, compared to 28% of men (Eurostat, 2001).

How are women represented in academic research and teaching? Thus far, not many comparable statistics have been available within the EU and internationally. The common pattern found from country to country is vertical and horizontal gender segregation: the higher the post, the fewer women, and 'women's fields' and 'men's fields' (Stolte-Heiskanen *et al*, 1991; Lie and Malik, 1994). The ETAN report (European Commission, 2000) contains the latest comparative figures on the proportion of women full professors in the EU countries and some other countries (Table 7.1).

Turkey is always mentioned in this context because it has a very high proportion of women professors from an international and European perspective: 21.5%. However, it has an elitist higher education system, where class rather than gender is the salient segregating feature in academic recruitment. Only 1% of women and 2% of men attend university and there is a 17.3% gender gap in illiteracy rates (Kahn, 1994; Acar, 1991).

Finland has the highest proportion of women full professors in the EU: 20% in 2000. Portugal, France and Spain in the Mediterranean are doing well. Interestingly, those Nordic countries, Norway and Sweden, that have generously funded gender equality programmes in universities for years (Bull, 1999; Edgren, 1999; Jordansson and Shands, 1999; Soyland *et al*, 2000; Husu, 1999), are not better than the Mediterranean countries on this

Table 7.1 Proportion of women among full professors in the EU and in some other countries.

Country	Year	% of women among full professors
Turkey	1996/7	21.5
Finland	2000	20.0
Portugal	1997	17.0
France	1997/8	13.8
Spain	1995/6	13.2
Norway	1997	11.7
Sweden	1997/8	11.0
Italy	1997	11.0
Greece	1997/8	9.5
UK	1996/7	8.5
Iceland	1996	8.0
Israel	1996	7.8
Belgium (Fr)	1997	7.0
Denmark	1997	7.0
Ireland	1997/8	6.8
Austria	1999	6.0
Germany	1998	5.9
Switzerland	1996	5.7
Belgium	1998	5.1
Netherlands	1998	5.0
Australia	1997	14.0
USA	1998	13.8
Canada	1998	12.0

Source: European Commission 2000 and KOTA database (for the Finnish figure in 2000).

indicator. The Swedish government has arguably the best gender equality rhetoric in the whole EU. In the 1980s and 1990s various positive action measures have been introduced, the latest being earmarked professorships for women or, as it was put officially, ‘under-represented sex’ (Jordansson and Shands, 1999), and a state-funded national secretariat for gender research¹³. Despite this, the proportion of women among full professors in Sweden is only 11% and has grown very slowly. The Swedish lesson is quite illuminating, showing how high level political and positive action are not necessarily enough to induce rapid changes in the gender balance in academic employment. As has

been referred to in the discussions here today, there are deeply entrenched cultural factors that can slow down and resist women’s advancement and attempts to change the gender balance.

The German-speaking countries - Germany, Switzerland, and Austria - form a cluster in terms of representation of women in academia; the level of women in the professoriate is only around 6% in these countries. This has prompted various active measures to improve the situation, especially in Germany (Müller, 1999, 2000;

¹³<http://www.genus.gu.se/>

Krizio, 1999), but also in Austria (Hey and Klemmer, 1999). The German Federal Ministry of Education and Research has established a special unit 'Frauen in Bildung und Forschung' to monitor and promote gender equality in higher education and research in Germany. Ironically, Switzerland pioneered women's rights to higher education by being the first country in Europe to open its universities to women. This was in 1865 (Abir-Am and Outram, 1987).

In a comparative 17-country study, Lie and Malik (1994, 1996) found the smallest academic gender gaps in countries where 'egalitarian traditions are combined with economic opportunities'. However, I would argue that their explanation was far from sufficient, because in their study two significant exceptions to the rule are to be found in Western Europe: Norway and the Netherlands. Both have relatively high academic gender gaps, but they are at the forefront in terms of gender equality policies within academia and more generally. Both belong to the most economically affluent group of countries in the world. High overall gender equality in these countries is reflected in global comparisons, as indicated in the gender equality indicators of the Human Development Report of UNDP (UNDP, 1995-2001). Both countries also have a well-developed Women's Studies infrastructure that has been supported by public policy for decades (Blokdij-Hauwert and Hof, 1999; Bull, 1999; Mottier, 2000; Soyland *et al*, 2000). Despite this, the gender gap in higher education and academia in both Norway and the Netherlands is relatively large. What is even more striking is that the gap is larger than it is in many other European countries, Northern America and Australia (Lie and Malik, 1996). According to the ETAN Table above (7.1), the Netherlands has the lowest proportion of women professors in the EU: 5% in 1997. Norway has 11.7%.

Denmark, with 7% women full professors, is an interesting exception in the Nordic area. Denmark, Finland, Iceland, Norway and Sweden are very similar when it comes to several social characteristics. However, for 20 years Denmark has had the lowest proportions for academic women in all disciplinary fields in the Nordic region (Stähle, 1996). Why this is so is difficult to say. A large ongoing Danish research project 'Gender in the Academic Organisation' is exploring this very issue.

The figures for Australia, US and Canada are slightly better than the EU figures. As most of you are aware, activism around gender equality in academia has been considerable in all three countries since the 1970s, as has scholarship in this area.

As you can see, indicators on the proportion of women in the professoriate provides interesting comparative insights, but obviously just focusing at the top does not tell us much about the broader picture. Other large variations exist in Europe when it comes to the university and research systems. How do European countries vary in terms of when women began to enter universities and when did the proportion of women start to grow substantially? Even in this respect there are enormous differences between European countries. There is no time to go into detailed statistics here, but the general trend is of an increase everywhere, as figures referred to earlier demonstrate. The persistence of horizontal and vertical gender segregation in higher education has been stated several times today. It is a universal phenomenon - true not only of Europe - but almost everywhere.

Turning to the issue of gender and power in the distribution of the so-called gate-keeping and decision-making positions in academia, a common pattern can be found: they are predominantly occupied by men (ETAN, 2000). Some interventions have been effective here. The ETAN report recognises efforts in Finland and UK to

increase the proportion of women on important scientific committees. For example, in Finland, the Gender Equality Act from 1986 was amended in 1995 by a quota paragraph that stipulates that in all public bodies there must be at least 40% representation of both genders. As a result the National Research Councils became gender balanced except for the Research Council for Natural Sciences and Technology which has 30% female members. In private research funding in Finland the situation is not so good; there are proportionally less women Chairs and board members in the largest grant-giving foundations than there are women in the professoriate (Academy of Finland, 2000). Only 14% of these gatekeepers were women in 1999. The ETAN report points out how several private charities providing large amounts of money for medical work, such as cancer research, have no women on their boards of trustees, scientific advisory board or medical advisory board.

Academic promotion systems merit cross-national comparison. Various kinds of non-transparencies may be found in promotion systems. Seemingly non-gendered promotion systems can have covert gendered elements and outcomes. An example from Finland is the so-called 'professors by invitation' procedure. I have demonstrated how this seemingly gender-neutral appointment system has clearly favoured men (Husu, 2000; Husu, 2001b). Traditionally professors have been appointed through open competition. The

invitation procedure was introduced in the early 1990s to speed up the appointment process that could, in some cases, take years. It was used increasingly from the late 90s until 2000, and in the late 1990s was used for over half of all professorial appointments. Women were more successful in open competition than in situations where invitation was used, as can be seen in Table 7.2.

Several universities have recently written the monitoring of the invitation procedure into their Equality Plan, for example, the University of Helsinki Gender Equality Plan 2001-2003, and the University of Tampere Gender Equality Plan 2000-2002.

It appears that there has been a decline in the use of the invitation procedure since February 2000. Between February 2000 and February 2001, 35% (N = 184) of professorial appointments were made by invitation. The difference between the proportion of women invited and appointed in open competition also decreased: 20% of those appointed by invitation were women, and 22.7% of those appointed in open competition. Whether the decrease in the use of the invitation procedure is a lasting trend is impossible to say yet.

In terms of the overall position of the university institution in society, there are intriguing east/west differences. Renata Siemienska from University of Warsaw has characterised Polish women academics as 'winners among the losers' (Siemienska,

Table 7.2 Appointments of professors by gender 1997- 2/2000

Procedure of appointment	All Appointments	Appointed women, per cent	Appointed women (N)
<i>By invitation</i>	173 (55%)	13.3%	23
<i>Open competition</i>	142 (45%)	26%	37
Total	315	19.0%	60

Source: Unpublished statistics, Ministry of Information.

2000). With the transformation from socialism to a market economy the position of the Polish universities has deteriorated. At the same time, the proportion of women in university posts has increased. A 'brain drain' from Polish academia, a drain abroad and a drain internally to the business sector have been observed. Women have tended to continue working in universities. Their proportions have gone up but, at the same time, their working conditions have deteriorated. Russian science professors have said that they wouldn't recommend anybody, woman or man, to go to work in the university sector because the universities are in such a bad state in their country. It is very important not to be blinded by high proportions of women in universities in some Eastern European countries because their high representation may hide these kinds of factors.

Large variations exist in Europe in terms of provision of family support to reconcile work and family. How the Finnish academia deals with motherhood is discussed in Husu (2001). Most Finnish academic women are mothers. The Finnish situation offers a lesson here as it has a high level of childcare and parental leave provision. These, however, clash in an interesting way with the culture and structures of academic research and funding systems. Academic women, especially those working on fixed-term projects or in short-term positions, don't always use the provisions to which they are entitled, or using these provisions has been made very difficult. Many had to reflect seriously whether or to what extent to use maternity leave because of the possibility of being sidelined during their absence. They may be told subtly or not so subtly that it would be better for the project, their careers or to convince others that they are 'serious researchers' if they did not use these provisions, or only used them partially.

Then there are mobility demands and age

and time limitations in academic careers in some countries. In Germany the principle of 'Hausberufungsverbot' means that you can't apply for a professorship in the same university where you have obtained your Habilitation (post-PhD degree) (Krizio, 1999). That can be detrimental for women with family responsibilities. In some countries there are various age and time limits for completion or eligibility. A debate about academic age versus biological age is emerging, but it is not very developed in all European countries. For example, I understand that in the Netherlands there is quite a big debate on this but in Finland it has only started to be discussed. The concepts of ageism and sexageism are useful here. Ageism that is applied to women and men differently has been named *sexageism* (Carpenter, 1996, p.142) or *gendered ageism* (Itzin and Philipson, 1995, p.88). Women may be perceived as being 'older earlier' than men. According to a study by Itzin and Philipson (1995) on age barriers at work in local government and the private sector it was generally men rather than women that thought this was the case. I think the issue of age and gender is very important to address systematically when discussing problems women face in advancing their academic careers.

There is a general lack of evaluation of gender equality policies in academia. A number of European countries have had policies for decades including Norway, the Netherlands, Sweden, Finland and the UK. What is hugely lacking are thorough, comparative, research-based evaluations on how effective these policies have actually been. As I mentioned earlier, countries which have had very vigorous gender equality policies are not necessarily those with better gender equality in academic promotion. By this I do not mean that these policies are useless, but that we need more research to learn under what conditions policies succeed, which types of policies work, and which fail.

As regards women's and gender studies in universities we find great variation in Europe in terms of their presence and visibility in research and teaching. This is important because gender studies and women's studies bring issues to the agenda that can influence and be integrated into science policy (Husu, 2001a). As Louise Morley mentioned in her presentation today, there has been chronic ignorance or rejection - I don't know how to put it - by governmental interventions of the knowledge produced by women's studies and gender studies in the last two decades. However, here we can also find variation between European countries. In Sweden the government listens to gender studies scholars quite a lot and relies on their expertise in a variety of arenas, whereas in some other countries the distance between policy makers and gender studies may be much larger.

Finally, I would like to present some historical trends and figures from Finland to illustrate how we have reached the relatively high figures of women at the top. The proportion of female PhDs has gone up enormously and quickly in the 1990s, so that nearly 45.2% of PhDs awarded in 2000 went to women. The lower level degrees have been heavily feminised for longer. In Finland we do have very good gender statistics thanks to an active gender equality lobby. These statistics are currently accessible online free of charge (time series from 1989) but, unfortunately, not all figures are available by gender and discipline. Table 7.3 shows the proportion of women university lecturers. As mentioned earlier, 20% of professors were women in 2000 but in 1983 they were 6.3%. Note that the German-speaking EU-countries and the Netherlands are currently at that level. Table 7.4 shows the proportion of women degree recipients in Finland since 1989.

Table 7.3 Proportion of women among university lecturing staff 1983-2000

	Professors	*Assistant Professors	Senior Assistants	Assistants	Lecturers	Instructors
1983	6.3	11.9	17.8	..	41.2	..
1985	7.1	12.8	20.6	31.3	41.8	..
1988	9.6	12.5	22.8	34.4	44.1	57.3
1989	9.7	16.6	22.1	37.7	43.4	62.7
1990	9.8	17.7	25.8	36.1	44.2	51.6
1991	10.1	19.2	26.4	37.7	46.3	53.4
1992	11.2	19.2	29.1	36.4	46.3	62.0
1993	11.3	21.4	28.1	39.2	46.2	57.3
1994	11.2	20.2	29.6	37.8	44.4	67.6
1995	12.4	20.7	27.9	40.9	48.0	65.1
1996	12.7	21.7	28.6	38.3	48.8	57.2
1997	13.7	23.6	30.0	39.2	54.8	66.7
1998	18.4	-	30.0	42.7	51.0	59.6
1999	17.9	-	33.4	45.4	54.0	59.7
2000	20.0	-	36.9	52.3	58.2	82.0

Source: Kota database 2000; Ministry of Education 1998.

* Category 'associate professor' was abolished in 1998.

Table 7.4 Proportion of women among academic degree recipients 1989-2000

Year	Master's Degrees	Licentiate Degrees	Doctoral Degrees
1989	53.8	32.7	33.3
1990	54.1	31.9	31.6
1991	54.7	35.6	32.6
1992	55.0	34.4	30.6
1993	55.1	36.7	36.6
1994	56.4	37.9	36.2
1995	56.0	41.6	37.1
1996	57.5	40.4	40.1
1997	57.2	39.8	40.1
1998	57.5	45.2	39.7
1999	56.1	43.4	43.3
2000	58.3	47.2	45.2

Source: KOTA database.

The high participation rates of women in Finnish academia could suggest that academia is a relatively female-friendly setting in Finland. My PhD *Sexism, Support and Survival in Academia. Academic Women and Hidden Discrimination in Finland* (Husu, 2001b) explored this very issue. It is a qualitative study on gender discrimination experiences, support and survival strategies in academia, based on over one hundred interviews and accounts of academic women from 11 universities and all major disciplinary fields in Finland. I interviewed women and also asked women academics to write their own accounts. What I was specifically interested in was how women themselves perceive their situation in academia and what kind of differential treatment they receive. I will summarise the main findings.

Discrimination experiences were not restricted to a specific career phase, so women who were on the lower rungs of the ladder and women who had made it to the top all reported some kind of discrimination. Either they had experiences it themselves or had witnessed this

happening to other women. I also looked at a small sample of women who had left academia. The overall picture of those who had left was that they had had very minimal support, although even some of the professors I interviewed reported having received very little support. Another quite shocking finding was that hardly any of my interviewees had had a mentor or were strongly pushed forward by a senior academic.

Finland is one of the leading countries if you look at global indicators on gender equality, but it is a myth (widely believed) that gender equality has been achieved. It was interesting to explore how academic women framed their experiences in this context. The following quotation is from an interview with a postdoctoral scholar in the human sciences, in her mid-thirties. She reflects on how she sees her place in academia:

I think I have received fair treatment in official matters. So what has seemed to be an obstacle has been sort of

unofficial. It was really like a revelation to me in my adult years because I was from an upper class family, I was always good in school and among the three best in class. I didn't have any visible handicaps and I was quite quick in my speech and had good language skills. So I didn't have any kind of social handicap until I was an adult, no social handicaps. I grew up believing that no one had any reason to presume that I would not be capable of anything because I was rather above the average on all these visible social attributes. When I came to university I had a couple of sort of shocks. I wondered what it was, what was wrong with me and then I realised, oh dear, that my professor wanted a boy. It was as if he was waiting until a suitable male student came along and I realised that my credibility in the university was weakened by the fact that I happened to be a woman. That was something I had never realised earlier. I had never really realised that something could weaken my credibility socially.

So this woman is contrasting the relative equality she experienced during her school years with her university experiences, characterising this as a culture shock. 'Culture shock' was also used by some other interviewees to describe their first encounters with academic culture. This interviewee also happened to have a matriarchal childhood family.

A female professor in the natural sciences discussed at length various homosocial patterns she had encountered in academia that she thought were quite prevalent. She said:

Oh my goodness, if I was a young man, I would be accepted in quite a different way, and I would have been pushed forwards. Some old professor would mentor me, would get me grants, take me to the sauna¹⁴ and explain to me all the networks and so on ... But I am outside all that. But in fact I want to be, because I feel it is terribly important that I do things as I do. That I am androgynous, that I am not like a woman in that way, I mean socialised as a woman in that way ... it is frightening. Certainly it is terribly threatening the independence that I radiate, in that I grasp the task and I do it. And on the other hand, a certain warmth that I also have confuses people. I am not a spinster or bitter or something; they have difficulties understanding this. But for men, absolutely the fact that I am fully independent is atavistically threatening to them.

I asked every interviewee where they thought they would be professionally in five or 10 years' time. Many found this very difficult to answer, which probably reflects a realistic assessment of the opportunity structure these women face rather than vague career planning. The following quotation is from a young scientist who reflects on the issue of motherhood. There was a career development workshop in her organisation where participants had to draw a picture of themselves in the future:

So I drew a picture where I had seven children.... no, I had 20 children and 20 books and I toured around the world

¹⁴Note that in Finland saunas have been important places, traditionally, for high-level negotiations.

lecturing on my special field and there was this kind of personal or private life and working life full of activity and challenges....these kind of things, but I don't know. But it was a sort of totally uncritical picture.

A prevalent pattern for female academics is to combine a full-time academic career and family. Most academic women have children but they have children when they are slightly older than other women (see Table 7.5). Evidence suggests that the younger generation of academic women are combining motherhood with an academic career more often than older generations. Thus the idea that increasing women's educational attainment means lower fertility rates is not correct as far as Finland is concerned. The fertility rate in Finland in 2000 was 1.73: among the highest in the EU (the EU average is 1.53). Note also that France, where women's education level is relatively high, has the highest fertility in the EU (1.89 in 2000).

A crucial issue in my research was how to render my interviewees not as victims of

discrimination but as actors. In addition to forms of gender discrimination in Finnish academia, I explored the ways in which academic women responded to their discrimination experiences and how they tried to cope and advance in academia. Several survival strategies emerged that were employed either consciously or subconsciously. They ranged from ignoring and trying to push aside discriminatory events to active interventions of various kinds. The latter included asking questions, making proposals, seeking support and making formal complaints. Exploring and making visible what academic women actually do when encountering sexism, gender discrimination and sexual harassment can be empowering and educational. So my research has a mixed message. Finland is far from a paradise of gender equality for academic women, despite the internationally high figures. However, I think it is important to highlight the gendered culture of academia and the tacit knowledge around this. It can be disempowering in the short-term, but seeing the bigger picture can be empowering in the long-term and helpful in putting one's own experiences in context.

Table 7.5 Proportion of women with no children by age group among those with a PhD and all women in the same age group in 1998

Age with PhD (N)	Women PhD and no children, %	Women with in the age group with no children, %	All women
20-24	1	100	87
25-29	75	71	58
30-34	367	49	32
35-39	606	36	20
40-44	597	31	16
45-49	601	23	15
50-54	530	26	14
55-59	357	24	14
60-64	148	34	15
65+	222	47	-

Source for data: Academy of Finland 2000, Appendix 5 (a).

*Dr Diane Bebbington
Research Officer, Athena Project*

Athena Project

Caroline and I are going to talk today about the activities of the Athena Project since its inception in 1999. First, I will briefly mention the background to the project, the policy context, and introduce the members of the Athena team. I will then give an overview of the presentation Caroline and I are giving today.

In terms of the background to the project, the Rising Tide Committee of 1994, which was chaired by Nancy Lane, and who is with us today, was set up to address the under-representation of women in science, engineering technology (SET) in all sectors, not just higher education (HMSO, 1994). In the same year, the Commission on University Career Opportunity (CUCO) was formed by Universities UK, the former Committee of Vice Chancellors and Principals. This aimed to look at equal opportunities in higher education across the board, not only on account of gender inequality. A year later the Promoting SET for Women Unit was set up. Four years after that, the Athena Project was launched with the aim of improving the recruitment, retention and progression of women scientists in higher education employment. The Funding Bodies and the Office of

Science and Technology fund it until 2003. We are now housed within the Higher Education Equality Challenge Unit. The four members of our team are Fiona Waye, Caroline Fox, Fiona MacLean and myself.

Today, I will be talking about the first two items: the Athena literature review (Bebbington, 2001), and a new project that I am undertaking to reanalyse the data that Margaret Blake was discussing in her presentation *Who applies for research funding?* Then I will hand over to my colleague, Caroline, who will be talking about the 2000 and 2001 development grants and the Awards Scheme. Caroline has been at Athena since the beginning of the project and I took up post with the project last October.

In terms of the aims of the literature review, which are actually stated in the document itself, when I first took up my post as Research Officer with Athena I felt an important task was to bring together recent research and policy in this area. It seemed to me there was no one source where all that information was collated - the literature review doesn't go into a lot of depth about these studies - but was intended as a resource for further work. Briefly, the aims were to provide an overview of recent research on women's academic careers across the disciplines; I thought we needed that background, and I hope that is reflected in the conference today. A lot of the issues that are common to women scientists in higher education are common to women in higher education more generally. But secondly there was a need to highlight studies that were focusing on women's higher education in the sciences in particular. Thirdly, to identify areas where research is lacking and insufficient and finally to make recommendations as to future research directions. That is very much what I hope this conference today will do - to pull together what there is and to help lead the way in the future.

The substantive findings of the review are in the document you have already. As we are hearing, there has been a lot of research on policy around women's careers in higher education. However, one of the areas where I think it is very lacking is in how the disciplines vary. We heard this morning that there are some patterns that are common to all the disciplines: the further up the academic ladder you go, the greater the attrition of women. On the other hand, we have quite a high representation of women in biology at the lower levels, but rather few as professors. In engineering we still have not so many women undergraduates in engineering and that has increased very slowly. So there is obviously an issue, a variation between the disciplines and we can't lump all academic women together - we have to also look at disciplinary differences.

So what are some of the main findings of the review? Well, I will just pull together some of the things which probably echo what we have already heard today. In SET, women are now gaining about 33% of PhDs; these are 1998 figures. In biosciences there are now more women gaining PhDs than men: 53%. If you look at the other disciplines - maths, engineering and IT - women are still in the minority.

Another thing I found was that data on experiences of the PhD process differentiated by gender are sparse. I think Valerie Snewin in the audience earlier on was saying that it is important to look at the whole pipeline of academic careers; you can't just focus on people once they are qualified and employed in academia. Diana Leonard, at the Institute of Education, is writing a book at the moment about gender and experiences of doing a PhD; I think that that is an area that we need to look at much more. One of the questions is: do women experience supervision more negatively than men? And that is something we are not very clear about.

Another thing that we find is that the career patterns of academic women are similar in the US, Australia, and the EU. And, although Liisa's presentation points to some differences, we still have some commonalities: that women tend to be concentrated in the lower echelons and they are more likely to be employed on short-term contracts. So there are differences and commonalities here. Another thing I looked at was women in positions of influence in science. Women are generally still poorly represented there. The Promoting SET for Women Unit has actually looked at figures of women in positions of authority on scientific public bodies and found that there has been an increase. However, the ETAN report has pointed to continuing problems: in the top positions in the Directorate General of Research there is still quite a small proportion of women. A final point is that there continues to be a minority of women gaining prestigious awards in science.

As I said earlier, we continue to need more data on the PhD process itself. These data could include qualitative and quantitative studies on completion times - this is in terms of future research - supervision issues and disciplinary differences. In terms of academic careers, how do women's experiences vary across the disciplines? Also a major deficit - and this is something we are finding in this Equality Challenge Unit, as I am in discussion with the policy adviser on ethnicity and race - is that we are very unaware of how different groups of women's careers in the sciences pan out. One of the things that we are going to be discussing is: is Athena actually addressing the needs of women from ethnic minority backgrounds? I think it is something up to now that, in effect, we haven't addressed at all. Another thing is that, I think, in studying academic scientist's careers, particularly qualitative studies, it is also important for our own theoretical understanding of the relationship between gender and science, and that is a really interesting, complex area.

Finally, quantitative data: again we have had discussions in the Equality Challenge Unit about that in terms of whether the data we are getting from HESA are adequate in terms of what existing data tell us, how they meet our needs and what needs to change. I am certain that in the area of race and ethnicity - we are having discussions in terms of how ethnic groups are categorised within that data, and how they may not meet the needs, for example, of monitoring which is what the unit will be looking into.

The second aspect of Athena's work I wish to talk about today is the reanalysis Athena is undertaking using the data collected for the project *Who applies for research funding?* that Margaret Blake presented this morning. As Margaret has already explained, the main purpose of that project was to look at why women are less likely than men to apply for research funding.

The dataset is a major resource of information on the careers of over 3,000 academics in the UK that includes data on structural and contractual factors, such as seniority, whether employment is permanent or fixed, full-time or part-time. Information is also available on the proportion of time spent on teaching, administration, research and training conferences. Professional achievements, such as publications, grants and fellowships applied for and awarded, qualifications gained, and participation in the Research Assessment Exercise (RAE) are all included. Information on the institutions include type of institution (whether a main recipient of research funding, other old university or new university), availability of support for funding applications, career guidance and flexible work arrangements. In addition to professional aspects, a range of data on personal factors was collated, including marital status, age, ethnic origin, age of youngest child, who has the main responsibility in the home for housework, and for childcare, and the main activity of the partner or spouse.

Athena, as I pointed out earlier, is interested in women scientists. On the basis that the dataset has information on the main research area, we will be undertaking a secondary analysis of the data looking specifically at the subset of women scientists. The analysis, it is hoped, will address some of the gaps identified in the Athena literature review. Four main scientific groupings have been identified from the research areas that are of interest to Athena: life sciences, engineering and materials, mathematics and IT, and physical sciences and processing¹⁵. The aims of the secondary analysis are as follows:

- To examine the relationship between employment grade in higher education scientific employment and professional and personal factors
- To compare the relative impact of these factors on employment grade using multivariate analysis
- To compare the impact of these factors on career progression in science with their impact on non-scientific disciplines. Comparisons will also be made amongst the four scientific groupings.

The analysis will be guided by a range of research questions that relate firstly to qualification levels. For instance, how do the proportions of women qualified to doctoral level compare with men and how does this vary across the disciplines? Are younger women 'catching-up' in terms of PhD qualifications in the sciences overall? How does progress compare across the sciences? Are women older than men when they gain their PhDs? Are there disciplinary as well as gender effects in age at gaining a PhD? Is qualification to PhD level equally important as a factor in professional development in the SET disciplines as compared to the non-SET disciplines? Are there differences amongst the SET disciplines?

Secondly, the analysis will seek to answer questions relating to career progression, such as what positions do women occupy in the academic hierarchy? How does this vary between the SET and non-SET disciplines and amongst scientific groupings? How does the pattern of segregation vary across different institutions, for example, pre- and post-1992 universities? Are women and men of the same age likely to be in similarly-graded posts? Are there differences here between the SET and non-SET disciplines? How are career 'success' factors, for example, seniority, publications, inclusion within the Research Assessment Exercise, fellowships, successful grant application, and so on correlated with gender and discipline? Through this analysis it is intended to get a clearer picture of women in academic science; a base of evidence that will feed into initiatives to improve their career progression.

¹⁵Life sciences include anatomy, physiology, pharmacology, biochemistry, biological sciences, and environmental sciences.

Engineering and materials cover earth sciences, general engineering, chemical engineering, civil engineering, electrical and electronic engineering, mechanical, aeronautical and manufacturing engineering, mineral and mining engineering and metallurgy and materials.

Mathematics and IT includes pure mathematics, applied mathematics and computer sciences.

Physical sciences and processing covers clinical laboratory sciences, food science and technology, chemistry and physics.

Caroline Fox
Athena Programme Development Manager

I am going to talk about what has been achieved in the first two years of the Athena Development Programme and what the project is planning for the future.

In April 1999 Athena announced a competition for our first development grants. We decided to focus on mentoring, networking and personal and professional development. We saw these as the place to start, the softer end of our agenda, but also where success would be more easily achieved. We chose those which seemed to offer the best contribution to Athena's aims and were a good mix. I should say that the grants we offered were small and we required their recipients to provide matching funding. The commitment of the institutions' most senior management was equally important for the success of the projects. All the projects were successfully completed in 1999/2000.

Athena development programme 1999

Bolton Institute, the smallest higher education institution (HEI) to take part, developed an external mentoring programme. As it had so few senior women in SET, Bolton enlisted senior women mentors from other HEIs and from local SET industry. Mentors benefited as much as the mentees, developing their own support network. On the advice of her mentee, one mentor applied for a post she would not otherwise have considered. She is now a Professor of Engineering. Another mentoring partnership resulted in a successful joint research grant application. Currently, Bolton is looking for funding to develop and expand its mentoring programme into a regional scheme.

The University of East Anglia (UEA) developed a network, ResNet, for women at the beginning of their careers in SET, and most of these were contract research staff. The network is continuing to run a varied programme of activities designed to develop confidence and skills. The network was determined to influence university management and knew that data were needed to support anecdotal evidence of differences in the career development of men and women. External sponsorship was obtained for a survey of men and women research staff. The results were presented to the Vice-Chancellor and other senior managers in Summer 2000.

Imperial College explored a number of different approaches to mentoring. A letter from the Rector to prospective mentees and to academics inviting them to become mentors gave the project a good start. The mentors all mentored women outside their own departments. The male mentors were surprised at how women were treated in other departments and were not aware of discrimination in their own departments. For the first time they could appreciate issues from the perspectives of the young women themselves. Imperial was committed to continue mentoring strategies that were effective and established a programme for younger male and female SET staff. The college also recognised the value of networking for women who felt isolated by establishing an annual networking event; the first took place in May 2001. Professor Lotte Bailyn of the Massachusetts Institute of Technology delivered the First Imperial College Athena Lecture 'Gender Equity in Academia: Lessons from the MIT Experience'.

Nottingham and Loughborough Universities undertook a staff development and mentoring programme for women in the early stages of their careers. Mentoring was provided for women attending a five-day staff development course. All the mentors were

women in SET from the two institutions. The programme's second objective was the development of mentors' interpersonal skills. The careers of the participants will be tracked over the coming years. The universities have now formed a Local Academic Women's Network (LAWN) involving five East Midlands HEIs and continues to disseminate the good practice that has been developed. The LAWN ran two conferences on how to make a successful research career.

The Open University (OU) undertook a study on career choices and barriers, the benefits of flexible working and staff development. The study explored why the OU was more successful than other HEIs in recruiting and retaining women as full-time lecturers and part-time associate lecturers in SET. It is clear that if HEIs are serious about increasing the number of women in SET, they need to provide staff development and flexible working opportunities for all staff, including part-timers. They also identified the importance of research experience and updating teaching and research skills for women returners. The study was presented at a national conference in 2001.

Sheffield Hallam University (SHU) WiTEC¹⁶ at SHU developed a mentoring training programme consisting of research and dissemination that aimed to challenge institutional culture and attitudes to women's career progression. The pilot mentoring training programme aimed to raise awareness and improve understanding of the career barriers faced by women in SET. SHU identified mentoring as an important means to improve women's retention and career progression. The training course has been integrated into the university's staff development programme.

Areas that improved as a result of these projects were:

- Interpersonal skills for mentors and mentees
- Understanding by senior academics of the obstacles younger women face
- Opportunities for career advancement
- Networking opportunities that both decreased isolation and increased visibility.

Equally important was the joint involvement of senior management, heads of SET departments, and women in SET. Professor David King, Chief Scientific Adviser, on launching the Athena Report on the 1999 Development Programme, made it clear that this approach was fundamental and that there was a need for:

...the commitment of senior HE management to examining their institutional policies and processes and their impact on women. Then Heads of SET departments who are critical to the successful implementation of those policies and processes, the recruitment and promotion and support of all their staff to make sure that HEIs do not lose these scarce-won talents. Lastly, and importantly, the women in SET who should be helped and encouraged to expect more support and guidance from their managers, to understand and engage in policy development and to take responsibility for themselves through self-development and confidence building.

¹⁶WiTEC – Women in science, engineering and technology, a European-wide network with national structures that works for 'the motivation, development and support of women in science, technology and engineering'. <http://www.shu.ac.uk/witec>

Athena 2000 development programme

Lessons learnt from 1999 were carried forward into the 2000 development programme. Some of the most difficult issues were addressed: institutional culture, values, attitudes and behaviour, organisational practices, systems and arrangements and the personal factors shaping or constraining women's career choices and outcomes. The 2000 projects addressed cultural aspects through policies, practices and procedures:

The University of Edinburgh investigated career trends and changes to institutional practices that constrained career potential.

Heriot Watt University looked at ways to improve the development, promotion and retention of women academics.

The University of Luton reviewed the inclusivity of committees including the representation of women.

The University of Oxford identified barriers deterring women from applying for academic appointments.

The University of Surrey analysed the progression of male and female academics and developed strategies for career development.

Local Academic Women's Networks (LAWNS)

Networking occurred in all the 1999 projects. In 2000 we recognised its potential and made small grants to our five 'grass-roots' LAWNS based in Leeds, Loughborough, Plymouth, St Andrews and UEA. The LAWNS are committed to women's career development, supporting Athena's aims to:

- Raise the profile of women academics locally
- Promote the work of less experienced women researchers
- Encourage collaborative opportunities for researchers
- Encourage the appointment of women to strategic internal, national/ international committees and other bodies, e.g. editorial boards
- Integrate Athena's aims into institutional and departmental strategic planning processes.

Early indications from the 2000 development programme are that barriers are often invisible to those on the inside track; it may be easier for academics to see problems in other departments. Women suffer from visibility and invisibility compounded by the gossipy academic environment.

The future

I had hoped to send you away with two further publications: our first Good Practice Guide and the text of Lotte Bailyn's Athena lecture; however, printing problems dictated otherwise.

The Good Practice Guide

The Good Practice Guide is based on our work in 1999 and on key reports on women in SET. We hope the guide will provide ideas to stimulate universities and women's networks to enter the new Athena Award Scheme.

Lotte Bailyn lecture

As with the Athena development projects, women faculty members at MIT collected data that convinced the Dean of Science that changes were needed. They felt that the same problems existed outside the science faculty and wanted to inform and educate the community. Here is a quote from Professor Bailyn's lecture that indicates the

extent to which gender was 'silenced' as an issue within the institution:

Our intent was to inform the MIT faculty, but when the report hit the front page of the *New York Times*, it informed a much wider audience. So, two years after the seeming end of the affair and five years after the committee started its work, the real impact began, on MIT and beyond. Before that, gender had been silenced at MIT, as at most universities. Women might occasionally talk to each other about these matters, but even that was unlikely. The women faculty in science certainly never did. Each person assumed that what happened to her was entirely due to her own behaviour and thus must be deserved. What is now accepted, at least by the women and the top administration, though not by everyone by any means, is that there are subtle gender dynamics that contribute to the leaking pipeline and to the more negative experience of the women senior faculty in comparison to their male colleagues.

Professor Bailyn said that there had been a strong belief in the university as a meritocratic institution that recognised and promoted talented individuals free of gender-bias:

There is a strong belief at MIT, and I suspect at most universities, that all existing procedures for judging talent and for making promotion and tenure decisions are fair and gender neutral. The belief that merit can be judged completely objectively is a fundamental tenet underlying university practices. Hence the thought that to achieve gender

equity one might have to reconsider some of these practices is very foreign.

Each new generation believed the gender problem was 'solved' until later on when they realised the playing field was not level:

Each generation of young women including those who are currently senior faculty, began by believing that gender discrimination was 'solved' in the previous generation and would not touch them. Gradually, however, their eyes were opened to the realisation that the playing field is not level after all, and that they had paid a high price both personally and professionally as a result¹⁷.

Following work at MIT the president invited the presidents of eight other research universities for a day's discussion on women in academic science and engineering. The presidents of Cal Tech, Stanford, Berkeley, University of Michigan, Harvard, Yale, Princeton, and Penn agreed to work toward three goals:

- To have the number of women on their faculties mirror the number they educate
- To ensure that those women already on their faculties have an equally positive experience as the men
- To have no faculty member - male or female - disadvantaged by family responsibilities whether for children, elders, or partners.

Is this the goal to which HEIs in the UK should aspire to, supported by Athena? As Professor David King said at the end of his keynote speech:

¹⁷<http://web.mit.edu/fnl/women/women.html>

I hope in my time in office that I shall see a change - the 10% barrier broken down and many more women making it to the top. I urge every Vice-Chancellor to look out for the good practice that is forthcoming from Athena and the Equality Challenge Unit.

The Athena Project runs until 2003 and there is still much to do. The next 12 months will see the publications I have written. The coming 12 months will see the publication of a number of reports I have set in train. Best practice that is identified from the 1999 and 2000 development programmes and the Award Scheme will be published in March 2003.

*Baroness Warwick
Chief Executive, Universities UK*

Senior women in higher education:

How far have we come?

Thank you very much for inviting me. I would very much like to thank the Athena Project for organising this meeting. It's taken some considerable initiative and it's clear just from the buzz and what people have said about it, that it's been a most interesting session.

I think an opportunity like this, bringing together researchers and policy makers in one place, is never easy to arrange. But it seems to me that this kind of gathering is immensely valuable. Meeting face-to-face is important. We can share a great deal of information. I know everybody talks a great deal on the net, but meeting face-to-face is very important, particularly to support Athena's mission which is to increase the number of women working in science, engineering and technology and to improve their career development.

This conference furthers one of the principal aims of Athena: to collect, analyse and disseminate information. Athena acts as a kind of information conduit, taking evidence from the sector, analysing it, monitoring it, consulting about it and responding to initiatives. Meetings such as these are enormously valuable in the exchange of information. I think we all

know how difficult it has been for the sector to collect the kind of necessary analytical material that enables us to make policy changes. I think we were very much exposed with the Bett Enquiry into pay in terms of the amount of what I would call proper management information in universities: to be able to make judgements about how we employ people and how we should promote them. Enquiry (Independent Review of Higher Education Pay and Conditions, 1999).

I congratulate Athena for organising this event, and I also thank the Athena Research Officer, Diane Bebbington, for her report that has been launched here today. It underlines the deep-seated problem of women's scientific careers in the academic world. There is a pressing need to produce evidenced-based policy that will compel tangible and lasting change. This has required a lot of commitment from all concerned. It's required a lot of tenacious work on behalf of many women in universities. That will need to continue, although I do think there has been progress. We all know, though, just how far we have to go. I think of what the 1993 White Paper, *Realising Our Potential* said, that 'women are the UK's single, most undervalued, and consequently underused human resource' (HMSO, 1993).

Figures from the Promoting SET for Women Unit in the Office of Science and Technology indicate that the proportion of women members of committees on a range of public bodies in the science-related field has gone up. Good. This is certainly progress - I'm delighted about that. It's important to know that. Women, though, remain a minority of members on many bodies, including the UK Research Councils, with the exception of the Economic and Social Research Council, half of whose members are women. Joyce Hill, present today, is not only Director of the Equality Challenge Unit, but also a member of the Arts and Humanities Research Board. We hope this

will become the Research Council for the Arts and Humanities and that this too will have a balanced representation of women members. In the area of arts and humanities that would be real progress, particularly as it does have - albeit still inadequate - a much larger number of women making it into senior positions than in the sciences and technology. Having said that I must add that we are not aiming for some token statistic. What we are aiming at is real cultural change that allows all women to realise their potential in all areas of academic life.

But we also know - and this is why I make the point about people on bodies such as Research Councils - that an insufficient number of visible women in positions of power leads to a skewed culture, in which there are barriers to achievement and far too few role models for inspiration. Take heads of higher education institutions, for example, that I represent. Out of 158 members of Universities UK and SCOP (the Standing Conference of Principals), there are only 19 women. When the gender mix of councils, appointment committees and panels and interview panels are skewed, it seems inevitable that the problems of women's career advancement are compounded. Nonetheless, I welcome each and every additional senior woman, and of course, it was good to spend this morning lobbying at the Lib. Dem. conference with Glynis Breakwell, the new Vice-Chancellor of Bath University. Brenda Gourley has also recently been appointed to the Open University. Let's not forget Julia Goodfellow, who has just been appointed to be Head of the BBSRC.

I was certainly delighted earlier this month when, at our residential meeting, Vice-Chancellors charged Universities UK with the task of instituting training and coaching for leaders in higher education, not just for Vice-Chancellors, but for all senior members of staff. I will do my utmost to ensure that women benefit fully from all the

measures we bring in. Such formal mentoring and coaching should help to counter the informal networking from which women are often excluded. I was talking about this just over the break. But I think it's that tacit old-boy network that women find so difficult to break into. And there is much evidence to show just how important those informal networks are.

I take a strong personal interest in this, borne of an acute awareness of the shortcomings in the sector, even though I realise we are no different from other sectors of public life. Nonetheless the shortcomings of the sector are all too obvious to me. I care deeply about this issue, both as someone who has worked in this sector as you've heard as a trade union official for nine years, and as Chief Executive of Universities UK for another six years. So I've spent a good deal of my life in the sector.

That is why I welcome the advent of the ECU. We now have for the first time a full-time office dedicated to the task of improving equal opportunities for all that work or seek to work in the sector. The importance of such an office was something we learnt from visits that Fiona Waye and I undertook in America where we looked at the way in which the American Council for Education was handling equally intransigent problems in relation to gender. This is a vast and important job. If you could see the wish list of the unit's staff and its high-profile steering group - they include representatives from a broad range of stakeholders - you would see a brilliant vision and a very long string of tasks. But in my view I think they and we have the commitment to deliver that vision. I think the work of the unit has to be eminently practical, tailored to the needs of the sector. The aim will be to ensure that equality and diversity become a reality for all staff in higher education.

This is the same vision that informs Athena.

It's what's behind the projects that Athena has used to try to transform the sector. With its awards scheme and high-profile seminars, Athena has helped to pave the way for the ECU and it is now part of that unit. I congratulate everyone involved for all its successes.

Within that new and broader context, Athena will broaden its own work into a much wider spectrum of equal opportunities and diversity issues, including race and disability. The Athena research review shows that little research has focused on the scientific careers of women from ethnic minority backgrounds. I look forward to Athena taking the initiative in these broader aspects.

Tackling the challenge of equality will not be quick, and will not be easy. Even as more women come through it takes time for their careers to develop and mature, time for reputations to be established - and reputation is crucial in academic life as all of you well know. It also takes time for expertise to be built up. But no step is too small to take. This is why we must take *many* steps. Athena was founded on the basis of supporting the practical and the doable. A synergy is created when these actions are initiated against the backdrop of broader social change influenced by reports such as MacPherson, legislation such as the Human Rights Act, and declarations by ministers that are amplified by the media.

The public mood is shifting; certainly the mood in the sector is shifting. It is poised to support the work of Athena and the ECU more than ever before. Incorporation into the ECU gives Athena the framework that can only increase its impact. It seems to me that this conference will reflect that new empowerment.

I am delighted that you asked me to say a few words. I am a very strong supporter of Athena. I think we are all going to have to

work hard to ensure that the ECU can deliver significant change, but with commitment. I am sure we will have some significant changes to report.

This is the question-and-answer session that followed Diana Warwick's speech:

Participant: I was very pleased by your comment that you were going to set up coaching practices and mentoring for senior women. Can you tell us what sort of groups of women that will include? You suggested that it wasn't just going to be women who had the potential to become Vice-Chancellors, but also perhaps women in senior administrative positions in universities or senior professors?

Response: Yes, I would hope so. It isn't just women. I think there's a general recognition in universities that we haven't taken staff development overall as seriously as we should. It's also been very difficult to get at what actually happens in universities. We have, as you know, HESDA, our own national training organisation. We work very closely with HESDA¹⁸. HESDA has been trying to get at what is actually going on in the sector. It organises a very effective senior management training programme, half of whose participants are women. But of course these cost. And therefore it's a question of trying to produce sufficient resources to be able to expand what is currently available into a very much broader arena.

It's not always the case that formal training is needed. Something like coaching and mentoring has become popular in other parts of the public sector - I'm quite heavily involved in the voluntary sector, and I know that the National Council for Voluntary Organisations has also been building up a coaching and mentoring scheme. What I would certainly hope is that Vice-Chancellors who feel that they would want

to take advantage of it would be able to do so. But all those Pro-Vice-Chancellors and senior professional levels also might be able to take advantage of it. We'd have to persuade universities to put more money into this approach. We've talked to the Department for Education and Skills, and I'm hopeful that we'll be able to work with them. If you look at other sectors like schools, like further education, there's been a very considerable amount of extra resource put into those sectors to encourage leadership and management development. I am hoping we might be able to encourage more public funding for that. It's very early days but I am hoping that, in the next couple of months, we'll have a programme that we can begin to talk about.

Participant: Is there any information or data on the recruitment of people onto the universities' governing bodies? Is that something the Equality Challenge Unit will take on board?

Response: That's a very interesting point. We have regular discussions with university councils and one of the things that we've agreed to do - I'm not sure how far we've got with it - is to find out very simply both the numbers and the gender balance of university councils. It's again one of those things where there might be a negative impact on senior appointments of a largely male, possibly business-oriented council. So we've agreed with the CUC¹⁹ to find out that information. It's not held centrally. The problem is - I think you may all have found this in your researches - that because universities are autonomous bodies they collect information in different ways for HESA or for the Department, or for their own management purposes. There is little exchange of information. There are groups of universities coming together to share

¹⁸Higher Education Staff Development Agency.

¹⁹Chairs of University Councils.

information, but that is largely on a financial basis. It's not usually - although I think universities are now beginning to think about this - in terms of pay and structures. The Bett Report was commissioned because we didn't know enough about what was happening about pay and grading and that gave credence to what many had believed for some time, that there were real issues of equal pay for work of equal value in the sector. But it took that inquiry to produce that information.

Participant: There's been a lot of talk today about the importance of statistics. One of the things that I think is a major problem in the higher education sector is HESA, the fact that we now have to pay for analyses. In the days of USR²⁰ it was fairly straightforward in terms of obtaining data for the purposes of secondary data analysis. Now it's become very difficult. Is there anything that Universities UK can do about this?

Response: I imagine that one of the things is that HESA is charging you in order to increase income. You are subscribers.

Participant: It's a form of privatisation. I mean it's cut us off.

Participant: When you say we are subscribers do you mean university departments? So we as university employees can obtain free analyses?

Response: No, I doubt that very much. I don't know what the answer to that is. I'll have to find out for you. But one of the things that may be of interest to you is that, as part of the review of quality and the new quality processes, a working group has been set up under the chairmanship of the Vice-Chancellor of York University to determine what information students need, ought to have, should be provided by the universities, and in what form that information can best be presented. HESA is going to play a very major part in that,

because it collects a huge amount of data. A lot of it has not been analysed in a way that has been particularly helpful to the issues that we want to explore. There is always the problem of universities hating to provide yet more data, hating to respond to yet more requests for information. But we are trying to establish a very much better body of information for quality purposes. It will go beyond quality, of course, because it will be available to any student making any choice about the nature of the course that they might follow.

So I will certainly pursue that question but it might be that there is something in that review that might be helpful.

²⁰Universities Statistical Record.

Appendix 1

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Appendix 2

Contributors

Professor Heather Eggins is Director of the Society for Research into Higher Education, Visiting Professor at the University of Strathclyde and Honorary Member of the Senior Common Room, Lucy Cavendish College, University of Cambridge. She previously worked for the Council for National Academic Awards following university teaching posts at the Universities of Colorado at Boulder USA, Warwick and Ulster. Her research interest is in higher education policy and she has edited a number of volumes on different aspects of higher education: *Restructuring Higher Education*, *Higher Education into the 1990s* (with Christopher Ball), *Arts Graduates, Their Skills and Their Employment*, and *Women as Leaders and Managers in Higher Education*. She is currently working on a volume on *Steering Change in Higher Education*.

Dr Judith Glover is Reader in Social Policy at the University of Surrey Roehampton. Her research interests are primarily in the area of women's employment, studied in both the UK and cross-nationally. Her teaching interests are comparative social policy and research methods. She has a particular interest in women in scientific education and employment, on which she has published in journals such as *Work, Employment and Society*, *Gender Work and Organisation* and the *Journal of Work and Education*. She is the author of *Women and Scientific Employment* (Macmillan, 2000) and *Risk and Citizenship* (Routledge, 2001, with R. Edwards). She is a member of the European Commission Research DG steering group 'Design and collection of statistical indicators on women in science', which is organised by the Women in Science Unit of the Science and Society Directorate.

Dr Louisa Blackwell has recently taken up a position at the Office for National Statistics as data quality manager for the Longitudinal Study. She is currently engaged in an on-going research programme investigating the relationship between education, employment and life-course transitions. She was a Research Fellow at the Centre for Longitudinal Studies. Her doctoral thesis, undertaken at City University, was on occupational sex segregation and part-time work. This involved longitudinal analysis using the Longitudinal Study and cross-national (France/UK) comparison. She has also carried out research in gender and ethnicity. She gained an M.Sc. in Gender, Society & Culture at Birkbeck College, London University in 1993, following employment experience as a surveyor and a lecturer in the construction industry.

Dr Margaret Blake works for the National Centre for Social Research, an independent research organisation. The National Centre carries out research studies, both quantitative and qualitative for government departments, research councils and charitable foundations. Margaret worked on a survey that the National Centre carried out for the Wellcome Trust and Research Councils looking at the key factors shaping funding application behaviour among women and men in British higher education institutions. More recently she has worked on the National Adult Learning Survey for the DfES and developed a module in the Youth Cohort Study about plans for higher education among 17 year olds.

Dr Louise Morley is a Reader and Director of the Centre for Higher Education Studies at the University of London Institute of Education. She was previously at the Universities of

Sussex and Reading. Her research focuses on gender, quality and equality in higher education. With Elaine Unterhalter and Anne Gold, she is undertaking research on gendered interventions for change in Commonwealth universities. She is also currently writing a book *Quality and Power in Higher Education*, to be published by the Open University Press in 2003. Other publications include *Organising Feminisms: The Micropolitics of the Academy* (Macmillan, 1999), *Breaking Boundaries: Women in Higher Education* (1996), and *Feminist Academics: Creative Agents for Change* (1995), both co-edited with Val Walsh and published by Taylor and Francis.

Dr Liisa Husu is a sociologist and expert on gender equality, with a special interest in inequalities in higher education and academia. She has been the National Co-ordinator of Women's Studies and Senior Adviser in the Finnish Council for Equality between Women and Men 1981-1996 and, since 1997, full-time researcher in the Department of Social Psychology, University of Helsinki. Her publications include *Hard Work in the Academy* (co-edited, Helsinki University Press, 1999), a special issue on gender and academia for the journal *Higher Education in Europe* (co-edited, UNES-CO/CEPES 2000), and *Sexism, support and survival in academia* (forthcoming). She is vice chair of the University of Helsinki Equality Committee (1997-) and moderator of the EQ-UNI list, the European Network for Gender Equality in Higher Education.

Dr Diane Bebbington is Research Officer with the Athena Project. She has extensive experience in researching gender and employment. Her previous posts include researching data availability on women scientists in Europe at the University of Surrey Roehampton and consultancy work for the DTI's Promoting SET for Women Unit where she collaborated on the commissioning of research on women scientists. Her most recent publication is the Athena Occasional Paper *Women Scientists in Higher Education - A Literature Review*. Her doctoral thesis undertaken at the Institute of Education, University of London explored the relationship between gender and science in the professionalisation of the health occupations.

Caroline Fox is Development Programme Manager for the Athena Project. After a degree in Economics from the LSE, Caroline became an NHS manager. Her interest in women in professional careers dates back to her secondment to the Department of Health where she was responsible for professional staff training, manpower planning policy and research. She was Director of Personnel, Imperial College then moved to the college-owned company Imperial Consultants. She was a member of CUCO and, together with Nancy Lane, originated the Athena Project. Caroline became the Athena Development Programme Manager in May 2000 and also works part-time as an HR consultant.

Baroness Warwick was appointed Chief Executive of the Committee of Vice Chancellors and Principals in 1995 (now Universities UK). Universities UK is the 'voice of UK universities' that represents their executive heads. Previously she had been Chief Executive of the Westminster Foundation for Democracy, which was established by Parliament to provide funding to organisations involved in strengthening democratic development overseas. During the 1980s she was the General Secretary of the Association of University Teachers, representing some 30,000 academic and senior staff in UK universities.

Appendix 3

Conference participants

Ann Aitken *Association of Commonwealth Universities*
 Dr Valerie Alabaster *Daphne Jackson Trust*
 Sara Al-Bader
 Adrien Alsop *ESRC*
 Dr Pauline Amos-Wilson *Evaluation Associates Ltd*
 Jan Anderson *University of East Anglia*
 Dr Susan Atkins *Women and Equality Unit, Cabinet Office*
 Di Barber *Construction Industry Training Board*
 Michèle Baron *Ministry of Research, Paris*
 Dr Diane Bebbington *Athena Project*
 Dr Louisa Blackwell *Office for National Statistics*
 Dr Margaret Blake *National Centre for Social Research*
 Alex Byrne *Institute of Physics*
 Dr Trish Coates *University of Leeds*
 Trudy Coe *Evaluation Associates Ltd*
 Teresa Cooper *Higher Education Funding Council for Wales*
 Dr Carolin Crawford *University of Cambridge*
 Dr Dimitra Darambara *Institute of Physics/University College London*
 Kirsten Dey *University of Southampton*
 Mohammed Dhalech *University of Oxford*
 Dr Anne Eady *University of Leeds*
 Professor Heather Eggins *Society for Research into Higher Education*
 Dr Judy Ekins *Open University*
 Patricia Ellis *University of Surrey Roehampton*
 Dr Mary Ann Elston *Royal Holloway, University of London*
 Professor Margaret Evans *De Montfort University*
 Dr Jane Fielding *University of Surrey*
 Caroline Fox *Athena Project*
 Zelda Franklin *University of Southampton*
 Christine Fraser *Higher Education Funding Council for England*
 Dr Barbara Gabrys *Open University*
 Professor David Gillingham *Coventry University*
 Dr Judith Glover *University of Surrey Roehampton*
 Dr Clare Goodess *University East Anglia*
 Jeanne Gordon *Southampton Institute of Higher Education*
 Dr Keith Gore *L'Oreal UK Ltd*
 Natalie Gray *University of Essex*
 Dr Simone Green *Staffordshire University*
 Gill Haben *Institute of Petroleum*
 Professor Wendy Hall *Athena Project*
 Amy Hayward *Higher Education Funding Council for England*
 Robyn Henriegel *Institute of Physics*
 Dave Hibbert *Equal Opportunities Commission*
 Professor Dame Julia Higgins *Athena Project*
 Professor Joyce Hill *Equality Challenge Unit*
 Dr Diane Houston *University of Kent*

Dr Felicity Hunt *University of Cambridge*
Dr Liisa Husu *University of Helsinki*
Gillian Jack *University of Luton*
Dr Robin Jackson *Universities UK*
Jennifer Kaheil *University of East Anglia*
Georgina Keane *University of Southampton*
Dr Viv Kendon *Imperial College*
Dr Nancy Lane *Athena Project*
Dr Kerry Leslie *EPSRC*
Professor Gillian Lovegrove *University of Northumbria*
Professor Paul Luker *Bournemouth University*
Professor Ruth Lynden-Bell *Queens University Belfast*
Dr Kristy MacDonald *Royal Society of Chemistry*
Dr Anne MacLachlan *University of California, Berkeley*
Fiona MacLean *Athena Project*
Dr Chris Mann *University of Cambridge*
Dr Helen Mason *St George's Hospital Medical School*
Dr Joan Mason *AWiSE*
Dr Sean McWhinnie *Royal Society of Chemistry*
Rhiannon Meredith *University of Oxford*
Rosa Michaelson *Athena Project*
Dr Louise Morley *Institute of Education, University of London*
Janet Morrison *NESTA*
Carol Parker *University College London*
David Pearson *University of Lancaster*
Dr Jan Peters *Athena Project*
Robert Price *BBSRC*
Professor Wendy Purcell *University of the West of England*
Dr Elaine Pye *University of Reading*
Dr Sarah Randolph *University of Oxford*
Dr Michael Rendall *Institute of Education, University of London*
Professor Kate Robinson *University of Luton*
Claire Sanders *Times Higher Education Supplement*
Anne Sibbald *HESDA*
Professor Bernard Silverman *University of Bristol*
Dr Valerie Snewin *The Wellcome Trust*
Dr Anila Syed *University of Oxford*
Dr Jane Taylor *University of Lancaster*
Professor Linda Thomas *Brunel University*
Ruth Tittensor *Institute of Biology*
Deborah Trayhurn *Leeds Metropolitan University*
Dr Kirsty Urquhart *Science Next Wave*
Dr Ruth Vater *University of Newcastle-upon-Tyne*
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Baroness Warwick *Universities UK*
Fiona Waye *Athena Project*
Dr Jean Webb *University College Worcester*
Liz Whitelegg *Open University*
Lynette Willoughby *Leeds Metropolitan University*
Dr Tiantian Zhang *University of Luton*

Appendix 4

Conference programme

New research on women, science and higher education

25 September 2001, The Royal Institution of Great Britain

Chair - Dr Nancy Lane, Athena Project

- 10.00 Opening address
Professor Heather Eggins, Society for Research into Higher Education
- 10.10 Women and scientific employment: current perspectives
Dr Judith Glover, University of Surrey Roehampton
- 10.40 The Women's Scientific Lives project
Dr Louisa Blackwell, Institute of Education, University of London
- 11.30 Who applies for research funding?
Dr Margaret Blake, National Centre for Social Research
- 12.00 Discussion followed by lunch

Chair - Fiona Waye, Equality Challenge Unit

- 1.30 Recent research on women in the academy
Dr Louise Morley, Institute of Education, University of London
- 2.00 Women in higher education: a European perspective
Dr Liisa Husu, University of Helsinki
- 2.30 Athena Project
Dr Diane Bebbington and Caroline Fox, Athena Project
- 3.20 Senior women in higher education: How far have we come?
Baroness Warwick, Chief Executive, Universities UK
- 3.45 Open forum
Panel chaired by Dr Susan Atkins (Women's Unit), with Professor Dame Julia Higgins (Athena Project), Professor Joyce Hill (Equality Challenge Unit) and Adrien Alsop (Economic and Social Research Council)
- 4.30 Closing remarks
Dr Nancy Lane, Athena Project
- 5.00 Reception sponsored by L'Oreal UK Ltd

For further copies of this publication (priced at £10 each), and
information on the Athena Project, contact:

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