Gender Mainstreaming as a Knowledge Process: the Epistemic Dimension to Eradicating Gender Bias

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This paper introduces the concept of gender knowledge (Andresen/Dölling 2005, Caglar 2010, Cavaghan 2010) and shows how it can be used to deepen our understanding of state attempts at the transformation of gender relations. The paper takes the implementation of gender mainstreaming (GM) in Directorate General for Research (DG Research) in the European Commission as its case study, comparing two sub-units within it.

The GM policy commits implementing organisations to eradicate the gender bias in their policy and actions. However, disappointing outcomes observed in multiple examinations of GM implementation have shown that the processes involved in the eradication of gender bias have been under theorised. Applying the gender knowledge concept in combination with insights from science and technology studies and the sociology of knowledge, this article deconstructs some of the dynamics involved in the perpetuation of gender bias and the efforts within DG Research to displace it. The findings illustrate the resources, collective dynamics and epistemic barriers involved in the implementation of GM and show the promise of the gender knowledge concept for a deeper analysis of both the reproduction of state bias, and possibilities for its eradication.

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Introduction

In marked contrast to gender equalities policies which preceded it, such as equal opportunities or anti-discrimination measures, Gender Mainstreaming (GM) explicitly targets the state itself as a key cause of gender inequality. GM was widely adopted throughout the world in the late 1990s, after the UN promoted it as the best practice approach to tackling gender inequality at the Fourth UN World Conference on Women in Beijing in 1995 (Keck and Sikkink 1999, True and Mintrom 2001). In theory, GM entails taking gender into account at all stages of policy planning and implementation, in all departments (the 'mainstream') so that governing organisations identify and eradicate their own gender bias. Thus implemented, GM represents a significant shift in the actions and workings of the state.

Numerous implementation studies have shown however that achieving this shift is far from simple. Implementation has been patchy and strong

political rhetoric in support of the policy has often been accompanied by insignificant change (Daly 2005, Hafner-Burton and Pollack 2002, Mackay and Waylen 2009, Rees 2002). These findings have led some commentators to argue that the sociological processes which successful GM requires remain under-theorised (Daly 2005, Mazey 2000): displacing gender bias is easier said than done. This paper develops the concept of gender knowledge in conjunction with existing ideas from science and technology studies and the sociology of knowledge (STS/SK), to identify and theorise some of the processes involved in implementing GM.

STS and SK approaches have focused on how ideas or knowledge 'sticks' — developing a conceptualisation of knowledge which emphasises the collective dynamics involved in its creation and replication, as well as, tools to understand its content more deeply. Applying these concepts to examine how conceptions about gender 'stick', this article develops an analysis using the gender knowledge concept to deconstruct GM implementation as a process of displacing gendered assumptions.

Drawing on interviews and documentary evidence, this paper examines GM implementation in Directorate General for Research (DG Research), the body in the European Commission responsible for EU science and research policy. Despite starting from a very low awareness of gender issues, DG Research has one of the most developed GM apparatuses in the European Commission (Rees 2002). The results of GM within DG Research nonetheless mirror those cited in wider literature: it has produced highly variable outcomes encompassing both change and non-change. DG Research thus represents an excellent case study to examine how an organisation can attempt to move from almost no engagement with gender issues to effective gender mainstreaming. Furthermore because its approach to GM has been so clearly marked by explicit efforts to tackle knowledge deficits, DG Research provides an excellent model to examine GM in terms of gender knowledge.

This paper considers gender knowledge processes by examining two parts of DG Research. Firstly it examines the actions taken by the specially created 'Gender Unit'[i] in DG Research. Based on interviews and documents, the findings show how staff in the Gender Unit approached the issue of gender equality in science from an initial position of 'knowing nothing'. Faced with this starting point the Gender Unit consciously sought to gather data and to undertake a transparent, stereotypically 'scientific' interrogation of the gender issue. As a result, a body of gender knowledge identifying gender equality issues relevant to the science and research policy community was created. The characteristics and content of this body of knowledge is then compared with findings from an operational sub-unit of DG Research 'Directorate XY', where GM has not been vigorously implemented[ii]. This analysis enables a comparison between the conceptions of the gender equality issue articulated in each location, and by focusing on an instance of non-change highlights some of the stages which GM implementation confronts. The data shows differences between the content of the Gender Unit's newly created gender knowledge and that existing in Directorate XY.

More importantly however, it also highlights the very different modes of perceiving at play in competing gender knowledges and the evidence bases which underpin them. These epistemic differences are central to assertions in directorate XY that gender is not a subject for policy intervention.

The findings therefore highlight some of the dynamics and barriers involved in displacing pre-existing ideas about gender. In DG Research GM entailed the *creation* and mobilisation of new gender knowledge — an extremely resource intensive processes. Whilst the Gender Unit's new gender knowledge is the product of conscious, stereotypically 'scientific' engagement and interrogation of gender equality issues in science, gender knowledge articulated in Directorate XY is often self described as a lack of knowledge. Despite this professed 'lack of knowledge', interviewees in Directorate XY nonetheless articulate descriptions of the gender issue which decisively depict it as impervious to policy intervention, consistently referring to anecdote and intuitive personal opinion as an evidence base.

The paper therefore shows how structuring an analysis of GM implementation using the concept of gender knowledge enables us to deconstruct and identify some of the resources and dynamics involved in the perpetuation or displacement of gender bias. It also highlights the importance of the ways of perceiving upon which gender assumptions are based, and the barrier they present. This deepens our understanding of the processes involved in 'successful' gender mainstreaming, or other attempts to transform the gendered state.

Gender Mainstreaming

GM is a potentially transformative gender equality policy which was pioneered and developed in the NGO sector for several years before the UN began promoting it. Whilst no definitive definition of the policy exists, the frequently cited European Council definition describes gender mainstreaming as:

> *"the (re)organisation, improvement and development and evaluation of policy processes, so that a gender equality perspective is incorporated in all policies at all levels and all stages by the actor's normally involved in policy making"* (Council of Europe 1998: 11).

The policy contains two important conceptual premises which owe their routes to feminist scholarship and activism. These are: the social construction of gender, and the state's role in its construction. The term *gender* was first coined by feminist scholars in the 70's and 80's to denote assumptions about the roles of the sexes and secondly to emphasise their socially constructed, normative and hierarchical nature (Hawkesworth 1994, Scott 1986). Scholars in the field of gender and public policy have subsequently evidenced many examples of the state's role in the construction of gender inequality through its *mainstream* policies. These studies have highlighted how policies across a range of areas disadvantage women and/or privilege men (Frazer 1989, Sapiro 1986,) and how assumptions about the roles of the sexes are reproduced by and in policies themselves (Hawkesworth 1994, Mazey 2000). Feminist scholars have used the terms androcentrism and gender bias to denote these tendencies (Hawkesworth 1994, Stivers 1993).

The GM policy builds on such findings and insights and embodies a prescription for action based upon them: states undertaking gender mainstreaming should eradicate androcentrism and gender bias from their policies. In practice, however, the eradication of gender bias has proven far from simple. Research on GM in various states and organisations has show that strong rhetorical commitment to the policy has frequently not yielded significant results in implementation (Daly 2005, Hafner-Burton and Pollack 2002, Mackay and Waylen 2009, Rees 2002). Various analyses have indicated that in many instances states or organisations taking up 'Gender Mainstreaming' do widen their gender equality remit to include new policy areas. The policies they put in place however, often do not aim to eradicate gender bias — in fact, they often replicate the gender bias which theoretically, GM aims to tackle (Verloo 2005, Bacchi 2005).

The practical undertaking of the eradication of gender bias and the barriers to this endeavour then, appear under-theorised (Daly 2005, Mazey 2000, Zalewski 2010). The next section discusses how an approach using gender knowledge and drawing theoretical insights from STS/SK enables us to conceptualise some of the dynamics involved in the existence of gender bias or androcentrism with greater clarity, leading to a better understanding of the processes involved in its displacement.

Analysing Gender Knowledge

Analysing gender knowledge (Andresen and Dölling 2005, Caglar 2008, 2010, Cavaghan 2010, Dölling 2005, Erberhardt and Schwenken 2010) this article focuses on *statements or representations concerning the differences between the sexes and the relations between them, the origins and normative significance of these, the rationale and evidence underpinning them and their form.* This definition builds on existing gender theory which emphasises the relational, normative and hierarchical nature of perceptions about the sexes (Scott 1986, Connell 2002) and STS/SK conceptions of knowledge emphasising the importance of evidence and form (Latour 1986, Latour and Woolgar 1979, Law 2003). The term gender knowledge thus refers to how the sexes and relations between them are perceived, both intentionally and unconsciously *and* on what grounds. It does not refer exclusively to *expertise* regarding gender issues, gender theory or gender equality policy (Andresen and Dölling 2005:50). Far from it: the differentiation and the competition between knowledge based on different disciplinary or lay methods of perception is a key locus of analysis in this approach.

This conception of knowledge is founded upon the social constructivist assumption that no knowledge is ever a simple reproduction of the way the world is. Rather, it is always at core one of many potential representations of reality (Callon, Law and Rip 1986, Latour 1986). STS/SK has focused on the dynamics through which certain knowledges secure a wider profile, acceptance and esteem than other representations. On this basis STS/SK supplies three central insights. Firstly STS/SK has highlighted the role which

different ways of perceiving play in knowledge creation and how these underpin different conclusions and representations (Latour 1986:22). These ways of perceiving may encompass different analytical methods, such as the commitment to or exclusion of particular kinds of evidence or adherence to particular modes of expression. Secondly, knowledge always takes material forms, — in texts, speech or a more modern technology such as a database, computer programmes or email (Law 2003, Latour 1986, Latour and Woolgar 1979) and thirdly, STS/SK emphasises the collective processes through which knowledge is developed. Knowledge builds on previous representation and iterations. As knowledge is reproduced in text or speech, moved around, referred to and repeated ('mobilised'), the conclusions contained within it and the ways of perceiving upon which it is premised become steadily more accepted and less vulnerable to question (Callon, Law and Rip 1986, Latour and Woolgar 1979, Latour 1986, Law 2003). In the parlance of STS/SK this knowledge becomes 'stabilised'.

Within organisations such processes can have significant impact on the shared assumptions dominating within in it and the actions it undertakes. Furthermore, stabilisation and mobilisation of knowledge within organisations reflects and is a consequence of distributions of power. The imposition of standard operation procedures, structured flows of information or consultation procedures and standardisation of data, shape the landscape for the expression within an organisation and can be controlled and manipulated by powerful actors. This approach therefore foregrounds the material dynamics involved in contests to define issues whilst also capturing the most useful insights supplied by post structuralist approaches such as critical frame analysis (Cavaghan 2010).

Applying this approach to the implementation of GM entails identification and examination of statements concerning gender in an organisation as well as attention to the form (e.g. text, speech) such statements take, their content and the ways of perceiving upon which they premised. In addition, analysis considers the processes of their creation and exchange and the distribution of influence over, and access to, such processes. Drawing these theoretical insights together with existing uses of gender knowledge I use a list of sensitising questions, (see Annex 1), drawn up with reference to existing findings on GM and gender theory, to focus on some of the most analytically important aspects of gender knowledge for an analysis of GM. As perceptions of the status quo of gender equality issues as unproblematic would clash with the aims of eradicating gender bias (Bacchi 2005, Verloo 2007), these sensitising questions emphasise the presence or absence, and details of, *problematisation* of gender equality, as well as the form representations take and evidence underpinning them.

Whilst my thesis covers each of the aforementioned aspects, this paper focuses on the content and epistemic characteristics of competing gender knowledge's present in DG Research, embodied in the documents which interview subjects indicated as important, as well as the gender knowledge they articulated during interviews. Interviews began with staff publicly attributed responsibility for gender issues in the Gender Unit. Respondents

from the operational Directorate XY were selected on the basis of recommendation from Gender Unit staff and through snowballing in Directorate XY. Gender knowledge pertaining to one aspect of DG Research's GM policy, women's occupational participation in science, is examined as an example.

Starting from zero

Prior to 1998 gender equality was not perceived as a relevant issue within DG Research, in common with broad opinion in the scientific community. No data concerning women's participation in science existed and the perception that the sector had no gender equality issues had been stable and officially unchallenged for some time. It remains a view held within the majority of the scientific community *"we know the scientific community doesn't know there is a problem" [Gender Unit Interview 2009].* In 1998-1999 however external publicity in the form of the publication of *Nepotism and Sexism in Peer Review,* in the scientifically prestigious journal *Nature* (Wennerås & Wold 1997) and *The Status of Women Faculty in MIT* (MIT 1999) prompted the Commissioner for Research to commit to policy intervention. Both publications explicitly engaged with the scientific community's wider perception that gender was not relevant in science and that no gender inequality issues existed, demonstrating the presence of a serious gender equality issue in science using stereotypically scientific methods.

The Commissioner for Research established a new unit, informally known as the Gender Unit to tackle the GM agenda. These staff shared the perception that there were no gender equality issues in science. One staff member charged with tackling the GM agenda described how awareness, including her own, of gender issues in science and what the policy agenda might entail was extremely low: *"My past was more gender blind ... I was typically the woman saying if I can do it others can do it … I think almost nobody knew about the gender issue"* [Gender Unit staff interview].   The Gender Unit began a process of compiling expertise on the gender issue: forming a working group which drew personnel from DG Employment, DG Education and Visual Culture and academics from Member States, who were already familiar with the gender issue. "*They were knowledgeable on the gender issue which I wasn't at all … I was really taking knowledges from the ones knowing the women's issues and I was analysing them with the DGR policy, how we can mainstream gender. Because you need these two knowledges."* [Gender Unit staff interview]. The output of this group was a Communication circulated to all Directorates in DG Research: 'Women and Science - Mobilising Women to Enrich European Research' (1999), which articulated a representation of the gender equality problem in science. It also committed resources to the collection and analysis of data on the issue. Using these resources the Gender Unit produced a body of data in 'expert' publications on the gender issue over the next twelve years[iii]. Several internal documents explicitly attempting to explain gender equality issues and actions to Commission staff[iv] were also produced, as well as multiple legislative

documents[v] repeating or referring to this new problematisation of gender issues and appropriate actions.
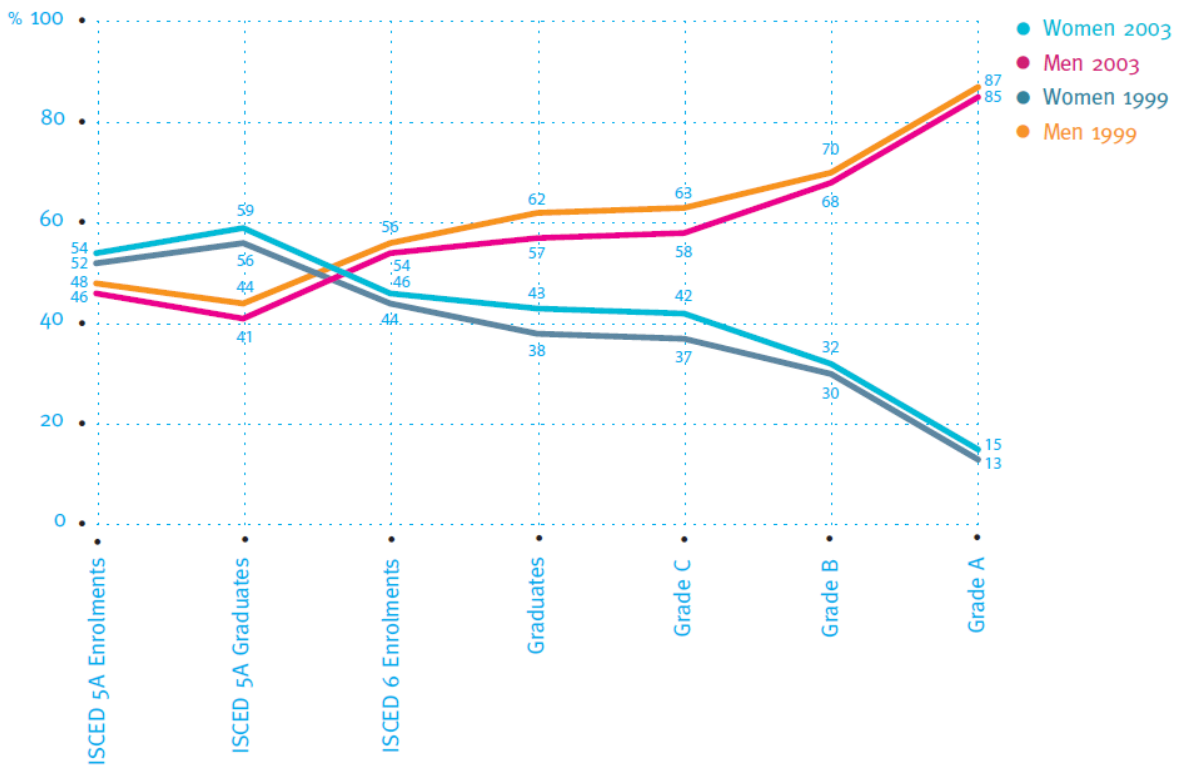
'New' Gender Knowledge

Analysing the content of the Gender Unit's outputs on gender issues, a number of characteristics can be observed. All of the expert and internal documents contain or refer to large quantities of evidence which were created using dedicated resources following the commitments made in the 1999 Communication. Creating this data has been a key component of GM activity and has entailed the mobilisation of individuals in all member states to pressure governments to collect data, through two specially established groups comprised of members from all EU member states.[vi] By 2000 a growing quantity of similar representations of the gender equality issue, based on this data and using similar, highly formalised and stereotypically 'scientific' techniques, can be observed. These documents premise arguments on an enquiry as to whether a problem exists and emphasise a need for formal data to assess this.

These publications define the women in science problem as one of vertical occupational segregation on the basis of EU wide, formal data. Two stable conceptual representations of the gender issue can be observed enjoying frequent repetition: 'the leaky pipeline' (ETAN 2000, Commission Staff Working Paper 2001, European Commission 2002, 2003a, 2003c, 2004, 2006, 2008, 2009) and the 'scissors diagram' (reproduced below Figure 1.1) both of which represent this pattern of vertical segregation (ETAN 2000, European Commission 2002, 2005, 2006, 2008, 2009). The leaky pipeline metaphor describes the pattern whereby although women enter university training in the sciences in ample numbers, the proportion of men increases with each step up the professional hierarchy. This issue is consistently represented using large quantities of EU wide data, variously analysed to illustrate a dynamic of vertical segregation. The ETAN Report (2000) for example shows 13 separate graphs illustrating the balance between the sexes at various levels of professional hierarchy. Six further graphs various nuances illustrate how the percentage of women's participation in science drops with each step up the hierarchy. Alternatively the She Figures, published three times since 2003, comprise around 60 graphs and tables over 107 pages, exploring the vertical segregation issue with only 11 pages of qualitative explanation/argument.

Figure 1. 'The Scissors Diagram'. Representing horizontal occupational segregation in science. Reproduced from Mapping the Maze: Getting More Women to the Top in Research (European Commission 2008:17).

"Scissors diagram" – Proportions of men and women in a typical academic career, students and academic staff EU-25, 1999-2003

Normative arguments form a minimal proportion of the Gender Unit's new gender knowledge when compared with the volume of data. The normative significance of gender equality itself is usually stated no more than once or twice in legislative documents or expert publications sometimes over 100 pages long. The qualitative statements which are made, focus on the 'waste of talent', arguing that Europe's competitiveness will suffer if female scientists, in whom Europe has invested training costs are subsequently under-deployed (European Commission 1999:4, 2001:5, 2002:1, 2003a, 2003b, European Parliament and the European Council 2002).

The new gender knowledge also explicitly argues *how* gender equality issue should be considered. The ETAN 2000 report for instance appeals for policy makers to approach the issue 'scientifically' (ETAN 2000:5) whilst DG Research's internal Working Paper (2001) argues the gender issue 'instead of being treated as an objective issue, provokes emotional reactions [too often]' (2001:3). The paper also repeats the need for a scientific approach to gender equality in science and describes five statistical dimensions, to capture the issue 'scientifically': numbers of women; vertical segregation; horizontal segregation; pay gap; fairness and success rates. DG Research has subsequently used these dimensions to structure its own monitoring.

The staff member driving the Gender Unit's activities spoke at length of the need to constantly urge DG Research staff to rethink their approach to the gender issue *"The argument I used for my colleagues … was that you are*

speaking about scientific expertise and that the policy should be based on the best knowledge, why isn't your policy based on expert knowledge?" [Gender Unit Staff Interview], *and* to adopt a 'scientific' approach *"They say that the system works well – look at this women at the top, but why are we never looking at longitudal [I say]? They say that because there is this one woman at the top that demonstrates …"* [Gender Unit Staff Interview]*.*

In common with stereotypically 'scientific' approaches, the expert knowledge on gender issues assumes there must be a cause to an outcome. Each of these reports moves on from the gender unequal outcomes which emerge from an analysis of scientific career trajectories in order to identify the practices leading to them. The ETAN report for example explicitly states that the scientific approach has uncovered bias in industry practices, using extensive amounts of data to argue that the leaky pipeline phenomena is '*not a natural outcome'*, presenting evidence of gender bias resulting in multiple discrimination against women (ETAN 2000:1). These biases included concepts of excellence which penalise scientists not on the basis of their scientific shortcomings but in response to typically female attributes or reproductive career breaks and a tendency to ascribe such typically 'feminine' attributes to women; recruitment through existing, and thus male dominated, networks; and sexism in the peer review and fellowship or grant allocation systems (ETAN 2000, European Commission 2000, 2002, 2003b, 2004, 2008, 2009, MIT 1999).

Based on its argument that practices and policies affect male/female balance in the scientific hierarchy, DG Research's expert knowledge pin-points opportunities within DG Research to ensure that its actions do not help to maintain the leaky pipeline (Commission Staff Working Paper 2001). DG Research's internal working paper presents 29 tables of evidence, comparing women's participation in DG Research's panels and staff, some of which show female participation rates as low as 4% or 0%, along with ameliorative actions which constitute GM in DG Research. Recommended actions, reproduced in multiple legislative documents, include responsibilities for all scientific project officers to collect data and implement gender action plans in their work, as well as the implementation of female representation quotas on Directorate committees.

Gender Knowledge in Directorate XY

By contrast, gender knowledge in operational Directorate XY, which is attributed within DG Research to have been relatively unaffected by GM, replicates some aspects of the non-perception of gender issues which staff in the Gender Unit describe before engaging with GM. During interviews, staff in Directorate XY explicitly articulated a lack of knowledge on the issue when asked about female representation in the work force, reasons for women's lower participation or DG Research's GM policy.

> *"Uh, aware – well…. Difficult, if you ask me does this exist, I say yes, but if you ask me am I aware?"* [Staff member C Directorate XY]
>
> *"Yeah, this is … I don't know. No I don't know."* [Staff member B Directorate XY]
>
> *"I don't know whether I understand the various reasons."* [Staff member C Directorate XY].

Interviewer: "Why there are so few women in [names field] research?"
Response: "That is a good question" [Staff member A Directorate XY]

"I don't know concretely …. But as far as I know they are doing a lot?" [Staff member B Directorate XY])

If we restrict our analysis only to codified knowledge, this purported lack of knowledge is borne out.   All staff interviewed in Directorate XY were unable to provide concrete information on the proportion of women in their field and Directorate. They were also unable to accurately identify personnel or offices which might have such data, even though each staff member had been identified for interview, by colleagues in Directorate XY or the Gender Unit, on the pretext that they were involved in the oversight of GM implementation or data collection. None expressed serious misgivings about this. Despite this reported lack of knowledge however staff in Directorate in XY did present a consistent interpretation of the women in science issue as one of 'women's lack of interest in science'. This was perceived as a trait of women.

        All staff described women's participation in their field as very, very low - which in comparison to other fields is correct. However, their representations of the status quo significantly underestimated the number of women entering the field. The evidence base which interviewees in Directorate XY drew on to underpin these opinions was always anecdotal, usually based on experiences as undergraduates over 20 years ago. "*When I graduated* [around 25 years previously] *there were only 2 women out of 100"* (colleague interjects *"2 out of 25 in my year")* [Staff Member A Directorate XY]. In this excerpt, typical of the views expressed in Directorate XY, the interviewee underestimates the number of women in his field by about 18%[vii] and refers to anecdotal evidence from his time at university 30 years ago. This interviewee does not demonstrate any awareness of the leaky pipeline phenomena, which in his field sees the proportion of women decline from roughly 20% at undergraduate level to roughly 2% by the highest professional level. When provided with DG Research's data indicating this diagnosis, this interviewee stated the figures were incorrect.

        Interviews with staff in Directorate XY also presented a consistent picture as to the reasons for women's lack of participation in science identifying the reasons in terms of the characteristics of women, based on personal opinion.
        "This is a hard science, in hard sciences you know, chemistry is more prone to women as a natural identification". [Staff Member A, Directorate XY]

        "Women are not interested in [this field] women are interested in communication, in journalism, in biology more, so its difficult at the school level to attract women inside, yeah because of the field" [Staff Member B, Directorate XY]

        "A lot comes from the fact it's a very science based discipline and I suppose at school there are fewer women interested in [names several natural scientific fields] maybe than men. Certainly this was the case when I was at university and whether it's still the case, I suspect it still is."[Staff Member C Directorate XY]"

        When presented with the argument articulated in DG Research's publications that policy practices or managerial cultures exclude female

scientists as they climb the professional hierarchy, all respondents indicated that they were unaware of such arguments and that they had not read the Gender Unit's publications on the subject. All respondents explicitly or implicitly argued that women are not represented in the field because of female specific qualities or preferences, usually centring on women's perceived preference for family and children. None of these articulations discussed the situation in terms of trained scientists.

> "Science is less sort of um interesting to women for some reason, less appealing to women." [Staff Member C Directorate XY]

> "Its difficult for a women to have a career because of the kids, also what do you want from your life, its different you prefer to stay with your family, even if you want to have a career …. I dunno." [Staff Member B Directorate XY]

> They're all getting married and leaving science altogether to bring up children. I don't know if that's true. Is that the implication of that type of statistic? [Staff Member C Directorate XY]"

Perhaps because of this identification of women with the family, rather than science, staff in Directorate XY also struggled to articulate a reason or justification to raise women's participation. The arguments which staff did make for the inclusion of women did not mention their professional skills as scientists and were based instead on 'female' characteristics or the pleasantness of female company. *"I don't know what women can bring, maybe a new creativity a new sensitivity maybe?" [Staff member B Directorate XY.]* On this basis staff in Directorate XY struggled to imagine what DG research could do to boost women's retention or participation and expressed normative misgivings about doing so.

> "Its not up to the Commission to decide for the people, if you go to school and you decide to be an engineer but you don't like [names field] you prefer to be a chemical engineer it's up to you! So it's a problem. [Staff Member C Directorate XY]

> "There's all these issues that are completely out of our remit." [Staff Member B Directorate XY]

> "Doing anything proactive, no."[Staff Member C Directorate XY]

> "Difficult issues gender [shakes head]" [Staff Member A Directorate XY]

> "[It] is difficult to find new ideas, and to and to try and solve, this problem, because the school (hits table) because of the school, because of the subject, because its [names field] so you don't have a lot of women who are interested in it." [Staff Member C Directorate XY]

Comparing Gender Knowledge

Comparing these gender knowledges, we can see significant differences in the qualitative perceptions of the gender issue which each articulates. The gender knowledge articulated in Directorate XY acknowledges significant differences between men and women's participation in field of research, but depicts the status quo as impervious to influence. It portrays this status quo as a reflection of women's lack of interest in science, on the basis of their female qualities. Gender equality actions are therefore understood as outside the remit of DG Research, as interventions in the personal choices of people, or simply as intractable ('difficult').

The Gender Unit's new gender knowledge on the other hand identifies the women in science issue as one of horizontal occupational segregation, showing that women do enter the sciences, but that their presence dwindles with each step up the hierarchy. This directly contradicts the notion that women are simply not interested in science. These qualitatively different perceptions are accompanied by deep cleavages in the evidence used to underpin perceptions of the gender issue. The gender knowledge articulated in Directorate XY is not contained in any codified form and does not have a tangible evidence base. Although its lack of evidential base is acknowledged by those articulating it, none expressed serious reservations about drawing conclusions based on anecdote or intuitive opinion. In the Gender Unit on the other hand, GM prompted a conscious, transparent 'scientific' investigation of the gender issue, which explicitly strives for a robust evidence base. The importance of this data was stated repeatedly in interviews with women in science stakeholders. *"The biggest achievement so far is getting the data, just getting the data in 1999 was a huge achievement"* [Expert Group Member]. *"It was like, now we have the data, so we have to do something you know"* [Gender Unit Staff Interview]. The resources which this has required are considerable. The scope of the data spans industry and research institutes in 30 states linked with DG Research's work. Its collection has involved individuals and government machinery in each of these states and has now been steadily collected over more than ten years. In turn, data has been analysed in line with 'scientific' standards, and codified into multiple 'expert knowledge' publications, internal communications and legislative documents. This gender knowledge continually represents and demands a new way of perceiving the gender issue in terms usually associated with policy which assume causal factors and demands evidence.

Conclusion

Data presented in this paper show the promise of using a knowledge based approach to analyse gender mainstreaming, or other attempts to eradicate the state perpetuation of gender bias. Using a knowledge-based approach enables us to deconstruct some of the component parts of gender bias and show some of the circuits involved in its perpetuation. Results show how prior to GM, ideas perceiving the women's lower participation in science as unproblematic dominated in DG Research. These views took the situation at face value —perceiving women's lack of participation as understandable, *presumably* because women were not interested in science. These views were/are based on presumption: a tendency of significant interest amongst a field of professionals and policy practitioners who identify themselves with the ideals of scientific enquiry.

The notion that it is sufficient to view gender issues in terms of anecdotal evidence and personal characteristics rather than macro level data and patterns represents a key barrier to GM in DG Research. This is borne out in the articulations of Gender Unit staff and analysis of gender knowledge in Directorate XY. Displacing this collectively condoned approach has been a key activity in DG Research.

This knowledge process has involved enormous resources extending beyond the immediate confines the Gender Unit and DG Research. GM, which draws on a large body of feminist public policy scholarship, enjoyed extensive promotion through the UN and the NGO community. The *Nature* publication and the MIT report further triggered action in DG Research to create a body of new gender knowledge which itself drew on data and persons spanning 30 states. As a result of GM, state resources are being used to create and continually renew a new, institutionally condoned, body of gender knowledge competing with the gender knowledge which previously dominated DG Research and which perpetuated women's disadvantage. Whilst this may appear auxiliary to the stuff of *gender mainstreaming* the analysis of data in this paper suggests that these extended, collective knowledge processes constitute a key stage in the displacement of gender bias in the state.

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Annex1: Analysing Gender Knowledge: Sensitising Questions

Content
- What is the status quo of gender relations in science and research?
- What is the status quo of gender relations generally?
- What mechanisms or causes account for the status quo?
- Objective/subjective dimensions of problem diagnosis.
- How *should* gender relations be? Is the status quo perceived as problematic?
- If there is a problem, why is it perceived as problematic?
- Who is at fault?

Policy
- What action should be taken? What action may not be taken?

- What would this action achieve? What should it not achieve?
- Who is responsible for this action?

Form
- State - are perceptions expressed/reproduced in speech, text or action?

Evidence
- Are perceptions explicitly reproduced, or stated?
- Are perceptions implicitly reproduced or stated?
- What evidence underpins perception? (e.g. direct experience, second hand information, 'scientific' evidence, Longitudinal/comparative numerical data, qualitative comparative data, popular conception, anecdote, normative beliefs?
- What understanding of causality is present? E.g. (natural, social, economic, organisational?)

Based on Verloo (2005) with additions.

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[i] The precise name and institutional status of the Gender Unit has changed several times in the last 10 years in DG Research. For ease I refer use the same term as staff with in DG Research and refer to it as 'the Gender Unit'

[ii] This case was selected on the basis of advice from several DG Research staff who indicated that 'Directorate XY' would constitute a case where GM has not been vigorously implemented.

[iii] ETAN Report on women and science: science policies in the European Union: promoting excellence through mainstreaming gender equality (2000), The Helsinki Group Report on national policies on women and science in Europe (2001), Women in public research and higher education in Europe (2002), The she figures (2003) Women in industrial research: analysis of statistical data and good practice of companies (2003) Women in industrial research: a wake up call for European industry (2003), Waste of talents: turning private struggles into public ones: Enwise Group (2004), Women and science: excellence and innovation – gender equality in science (2005), The she figures (2006), Gender and excellence in the making (2006), The she figures (2008), Mapping the maze: getting more women

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[v] Resolution of the Council on Women in Science 20th May 1999; Resolution of the European Parliament (EP) on the Communication from the Commission on 'Women and science - mobilising women to enrich European research the 3rd of February 2000; Commission Decision N° 2000/407/EC of 19 June 2000 relating to gender balance within the committees and expert groups established by it; Resolution of the Council on Science and Society and Women in Science 26th June 2001; Council Decision of the European Union Sixth Framework Programme of the EC for research technological development and demonstration activities contributing to the creation of the European Research Area and to innovation 28th January 2002; Decision of the European Parliament and of the Council concerning the Sixth Framework Programme of the European Community for research, technological development and demonstration activities, contributing to the creation of the European Research Area and to innovation (2002-2006) 29th January 2002, Decision of the European Parliament and of the Council Concerning the 6th Framework Programme of the European Community for research technological development and demonstration activities contributing to the creation of the European Research area and to innovation 27th June 2002.

[vi] The Helsinki Group and the Helsinki Group of Statistical Correspondents.

[vii] Compared to estimates for EU wide participation in the field in the 2000 ETAN Report.