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The contribution of feminist criticism to science

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ABSTRACT

This text discusses the contribution brought to scientific knowledge – or science -by feminist criticism, now that an increasing variety of ways of thinking can be observed. Science, guided by the production of scientific knowledge, presupposes neutrality, universalism and objectivity, perhaps a reflection of it masculinist characteristics. Feminist criticism has brought to light some limits that have been imposed on the greater access of women to scientific careers. The text emphasizes how the notion of gender becomes significant, insofar as it illuminates other dimensions of scientific practice.

Key Words: Feminist Criticism; Scientific Knowledge; Science; Gender and Inequality.

Introduction

> The difficulties and obstacles are many for those who dare to follow the path of the study of women in society; for it is a path so laden with the landmines of uncertainty, saturated with unsteady controversies, punctuated by subtle ambiguities that it is necessary to discern, illuminate and document, even though these may resist definition. The traditional epistemological markers - the universal human being, truth, the notion of science which guided the social sciences in the last century – can now be seen as buried. This is an inhospitable dominion for whosoever suffers from Cartesian anxiety, yet the destruction of inherited parameters is more fitting within feminist thought than the construction of unambiguous theoretical frameworks.
>
> *Maria Odila Leite da Silva Dias*

The premise which guides this article is centered on the contributions that feminist criticism has brought to the production of scientific thought – that is, to science. In other words, if on the one hand feminist criticism identifies certain critiques as directed at the historical process of construction of scientific practice, on the other, it claims to bring to light the contributions and changes brought to science with the rise of feminist criticism and women's access to science, especially within the field of social theory.[1]

The premise of departure is situated in the fact that the production of scientific thought has, historically, been considered a dominion 'reserved' for men.[2] This observation doesn't necessarily mean that women have been excluded, but it does signify a persistent resistance to their presence in the field of science. It assumes that the existence of a universal subject is no longer plausible, a contention that is just as applicable to the male self as it is emergent female individuality.

Data from the national research bureau (CNPq) registry (Diretório dos Grupos de Pesquisa) show (without including the special productivity grants in research)

> [...]in 2004 there were 41.168 men and 36.080 women engaged in research, which signifies a 47% female participation. Nevertheless, this percentage is limited to leaders and non-leaders: female leadership in research represents 42% of the total number of leaders. Amongst non-leaders, female participation is almost equal to male participation, at 49%. Amongst researchers with doctorates, the participation of women is at 42% as well.[3]

In relation to the number of productivity grants in research, in the category Pq 1-A (equivalent to level 1-A), the total is 1.081 in 2006, which is 29.9% (249) female researchers

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[1] First edition of the text", presented at the Research Group on "*The Contribution of Feminist Thought to the Social Sciences* ("A contribuição do pensamento feminista às Ciências Sociais") Brazilian Sociological Society Conference − SBS, May 31st to June 3rd, 2005 in Belo Horizonte.

[2] Sandra HARDING, 1996; Hélène ROUCH, 2003.

[3] Isabel TAVARES, 2007, pg. 1.

and 70% (832) male researchers in the various areas of knowledge. Nevertheless, the data also show that the distribution of female researchers concentrates them within the broader area of the Social Sciences (67), followed by the Biological Sciences (50) and Linguistics, Arts and Letters (40), with only six in Engineering. On the contrary, in relation to the distribution of male researchers, the greatest concentration is in the area of Earth Science (192), in Biology (169) and in Engineering (142).[4] The data reveals the scarce presence even today of female researchers above all in the area of Exact Sciences, demonstrating that scientific research activities are still fundamentally configured by social relations and sexist cultural indicators.

Thereby, we propose to begin our discussion by looking at some the presumed fundaments of scientific production in the history of modern science, the specifics of which are grouped according to: a) naturalist arguments, the condition of scientific neutrality, employing a male perspective and androcentric language; and b) a universal dimension attributed to scientific knowledge, such as the belief in the progressive character of scientific rationality. Feminist criticism, contrary to such paradigmatic elements, makes a contribution relative toward change in the fundaments of science, as well as with regard to the cultures which value them, elaborated over the course of the text.

Undoubtedly, feminists were neither the first nor the last to present a critique of modern science. Preceded by other actors, groups and movements − anti-colonialists, members of the counterculture, environmentalists, antimilitarists, among others −, they launched fierce critiques of the processes of scientific knowledge, which, in addition to other problems, excluded women from their undertaking.

What, then, became the specifics or particulars of the feminist criticism of science? In which peculiarity was feminist criticism centered? Our analysis will attempt to respond to some of these questions. Criticism itself focuses on the type of organization of the social and natural world as it appears in social, cognitive, ethical and political relations between men and women and in their expression and meaning in the symbolic world.[5]

The French historian Michelle Perrot said, in response to journalist Florance Raynal's question asking how to bring women out of the silence and shadows in which their status confined them for centuries; how the presence of women as objects of study of the Social Sciences would relate to the indignation of many over the presence of women in the political

[4] Statistics supplied by the CNPq, Brasília, in September, 2007.
[5] HARDING, 1996.

arena, in culture and as the subject of research, publications and with recent visibility in history [and in science]:

> The men are there. The history of men is there, omnipresent. It has occupied all the space, and for a long time. Women were always conceived and represented [merely] as a part of the whole, as individuals, and were, most of time, negated. We can speak of the silence of History regarding women. Therefore, it should surprise no one that historical reflection comes to participate in this discovery that women make of themselves and by themselves, an aspect of their assertion within the public realm [...] since women´s emancipation, which concerns the relationship between the sexes, is *one of the most important* facts of the 20th century… And those who are surprised are probably not aware of the considerable development that this reflection has shown in the Western world over the course of the last fourth of a century..[6]

That is, the absence of women and the respective silence regarding their presence in history, and, by extension, in the history of the sciences reveal, in the end, the hegemonic association of masculinity and scientific thought.

The Fundaments of Feminist Criticism

It makes sense to remind ourselves here that there is no "general (unified) critical theory" of feminist thought. Diverse theoretical currents do exist which, appropriated through general theory, are able - each in its own manner - to apprehend why it is that women occupy a subordinate position/condition in society. Since *feminist criticism* was first spoken of, it has generally appealed to the block of heterogeneous currents which attempt to explain why women largely continue to live in subordinate conditions, since at the core of any feminist current lies the recognition of a social and cultural female condition of subordination. Therefore, feminist criticism makes explicit, incorporates and assumes individual and collective awareness, which is followed by a *rebellion* against the forms of understanding which are present in sex/gender relations and the subordinate position which women occupy in a given society, in a given moment of history, as well as in the production of knowledge. It addresses a struggle to change/transform those relations and that situation.

Critical feminist thought originated as a *product of thought* which questioned the forms and expressions of prevailing scientific rationalities, bearers of the cognitive, ethical and political marks of their individual and collective creators, who are male. This critique has

[6] Trecho da entrevista realizada por Florence Raynal com a historiadora francesa Michelle Perrot, publicada na revista *Les Femmes dans la France*, Paris: Label France, n. 37, out. 1999. Disponível em: <http://www.ambafrance.org.br/abr/label/label37/dossier/01perrot.html>. Grifo meu.

examined the reflexive potential that such rationality has embodied, since scientists are also designated bearers of characteristics of gender, race, and social and cultural class.[7]

Thus,

> feminist criticism is relational and relativist in context and implies, from the beginning, an iconoclastic critical attitude which consists of rejecting universal totalities or fixed goals. It attempts to historicize the very concepts with which it must work, such as those of reproduction, family, public, individual, citizenship, sociability in order to transcend static definitions and cultural values inherited as inherent to a female nature.[8]

If on one hand feminist criticism opposes a knowledge which is totalizing, masculinist and universalist, on the other, it is worth remembering that its production carries the mark of its creators.[9] It was feminist criticism which took reconstructed historical conscience[10] as its starting point, making it possible to visualize a system of deep-seated male domination relative to women which was put forth as a substrate of scientific knowledge. In that context, women as individual and collective subjects and as subjects of knowledge would share the same exclusions and uncertainties as other social groups on the pathways of scientific construction, such as certain ethnic-racial groups.

Thus, the challenge of feminist criticism was precisely that of opposition to hegemonic epistemological and conceptual axis – categories, concepts and methods - so as not to reproduce, as a distorted mirror, the same categories of the system of scientific domination that were the objects of its criticism.[11] For this purpose it was necessary to propose and accept provisional concepts and to pursue indefinite theoretical approaches, to escape from the dominant symbolic order and to consider multiple temporalities, since scientific knowledge also implies a system of domination. Feminist criticism is also the product of interaction with social movements, in addition to other engagements such as that of the female experience in all its concreteness, which together become a component of the criticism that emerges in a moveable context, in an unstable and changing world. Thus, on the one hand, it is assumed that the critical fronts of predominant contemporary scientific knowledge, although persistent, are not and will not become permanent. On the other, feminist criticism, in challenging the

[7] HARDING, 1996.
[8] Maria Odila DIAS, 1990, p. 3.
[9] HARDING, 1996.
[10] DIAS, 1990.
[11] DIAS, 1990; HARDING, 1996; Evelyn FOX KELLER, 2003; and ROUCH, 2003.

masculinist "ethos" of science in the search for "dynamic objectivities", for example, has ended up entangling itself in the constraints of its own field.[12]

With the incorporation of the relational concept of gender, criticism implies "that male and female attributes are defined in relation to each other, and would also assume that terms such as sexual, feminine, masculine are not taken as self-evident, yet without being considered in their historicity".[13] In that sense, the relational category of gender, "[...] used more appropriately to refer to a system of signs and symbols which indicate relationships of power and hierarchy between the sexes [...]",[14] represented a decisive contribution to the least descriptive approaches, consolidating them into an analytical category whose conceptual density has been fundamental not only for an other/new practice of scientific production, but above all for the transformation of social structures.

Principal Elements Present in the History of the Formation of Modern Science

It is known that amongst the great philosophers and thinkers in the history of humanity, women were absent from the philosophical, historical, scientific and cultural discourse.. Very few were successful in participation. In the XVII and XVIII centuries, those who can be cited are: Madame d´Epinay; Madame du Châtelet; the Venetian Elena Cornaro Piscopia (1678), the first woman to have a seat at the university; the physicist Laura Bassi (1723), the second woman in Europe to receive a university rank; and Marie Curie, who, in 1903, shared the Nobel Prize with her husband. These were all modestly recognized as the "Other" subject producer of knowledge. Many are the historical accounts which indicate that modern science was constructed as a specifically male enterprise.[15] Francis Bacon and the other founders of the *Royal Society* hindered the presence of women in the universities by allowing only the presence of male philosophers, thinkers and scientists as worthy of the registry, as expressed below:

> Selon les termes de l´uns des primeirs membres de la Royal Society, Joseph Glanvill, 'la vrai philosophie' ne pourrait progresser là où 'les affections portent la culotte et le Féminin gouverne'. Deux siècles plus tard, alors que les femmes forçaient l´entrée de la profession médicale, le Dr Robert Christian, de l´Université d´Edimbourg, émit l´opinion que la pratique de la médicine par des femmes ferait 'injure à la profession scientifique qu´est la médicine'. Ces convictions étaient fondées sur une vision du monde totalement dichotomique et genrée [....] associant les femmes à la nature, à l´ obscutité, au mystère, au corps et aux émotions, les hommes au ciel, à la lumière, à la

[12] Maria Margareth LOPES, 2006.
[13] Ludmilla JORDANOVA, 1989, cited by LOPES, 2006, p. 39.
[14] Londa SCHIEBINGER, 2001, p. 45.
[15] Elizabeth KERR and Wendy FAULKNER, 2003.

> clarté, à l´esprit et à la rationalité [...] – l´objectivité – rejetant toute émotion éprouvée à l´égard de, ou toute identité avec l´objet de l´étude, à savoir la nature.[16]

As noted, the exclusion of the female presence was not only made explicit in terms of naturalization, since it was overly justified by the incapacity and the obscurantism of women, as opposed to the men, who were noted by light and objectivity. Thus, from the discussion of the authors above, the illustration of which is, in part, in the citation, several consequences can be inferred: a) the association of women with nature/biology, that is, with a naturalization of the feminine; b) the predominance of a world view and of knowledge – split, divided between present men and absent, obscured women; and c) the presence of an historical association between male, science and objectivity rooted in the predominant perceptions. Thus, we can see the privatization of scientific production by men.

The exclusion of women from the Field of science was justified by arguments placed within female physiology and psychology: "even the great English feminist Mary Wollstonecraft, in her efforts to create equality between the sexes, encouraged women to become 'more masculine and respectable' ".[17] That is, assimilating to man to be able to join certain scientific circles and be accepted in specific canons of knowledge constituted a passport to some scientists of the time. Whereas, if the founding scientific thought vindicated the idea of a subject – universal male -, which added up to the exclusion of women as much from scientific production as from its history,[18] after the French Revolution, liberal thought guaranteed male citizenship and suspended the conquests of female leadership in politics in the last decades of the Old Regime.

With some of the criticisms directed at a science based on an ideal of static and atemporal[19] objectivity[20] its founders, from Bacon to Descartes, made use of nature/biology as an inert and opaque subject[21]; they chose an expression of objective rationality, which rejected any relation to the studied phenomenon. Thus, the central argument of female exclusion from science would be placed within a triad: a) by male domination which naturalized the inferiority of women; b) by the consequent sexual division of labor; and c) by the monolithic, atemporal and excluding condition of science. In turn, feminist criticism

[16] KERR and FAULKNER, 2003, p. 49.
[17] SCHIEBINGER, 2001, p. 138.
[18] ROUCH, 2003.
[19] FOX KELLER, 2006.
[20] The authors FOX KELLER, 2003, and KERR and FAULKNER, 2003 consider the category of objectivity too vague to bear the multiple conceptions of scientific work, such as the universal dimension of knowledge since men just as women, considered subjects and agents of history and knowledge, do not remain imprisoned by fixed and universal categories.
[21] FOX KELLER, 2006.

rejected such founding elements which led to a science based on male and neutral referents and values, extensive in the field of social theory in the Western tradition. Contrary to such referents, in the critical feminist view, science is always steeped in material and cultural values.[22]

For feminist criticism, any form of science which is considered or proposed as universal must be harshly criticized, since all supposedly universal categories are stuck, in the end, with permanent parameters, including parameters of power. On the contrary, this is a departure from the idea that theoretical postures are constructed as a process of knowledge with a given transitory social context. Universal processes and categories run the risk of constituting nuclei or strongholds of a system of domination which, justly, is criticized by feminist thought. A singular and universal subject is not to be found in the laboratory. Thus, deconstructing and criticizing the universal totalities which form, among other things, the arsenal of predominant theoretical conceptions, becomes the target which, fundamentally, feminist criticism comes up against.

Therefore, women have been omitted from scientific communities for centuries, that is, from the academic and institutional spaces where science and knowledge are producedm even during the Scientific Revolution of the 17th and 18th centuries. Since that time, there has been a two-faced situation of absence: knowledge producers engaged in scientific institutions who, due to exclusion, have been unable to intervene in contents and notions of scientificity [23] which thus became markers of the inequality between men and women in the social structure of natural sciences, mathematics and engineering. “Scientific institutions – universities, the academy, industry – were structured on the assumption that scientists would be men with wives at home to take care of them and their children”

Scientific knowledge and contemporary feminism

From the end of the 19th till the middle of the 20th century, feminist thought has been built through a variety of theoretical strands and has therefore become the object of a variety of heterogeneous classificatory schemes. But mostly, it was the assumptions of liberalism – individualist values – and of socialism – egalitarian values [24]– that have served as an anchor for the initial premises of critical feminist thought. And more recently, feminist theorists have

[22] FOX KELLER, 2003; and KERR and FAULKNER, 2003.
[23] HARDING, 1996.
[24] Bila SORJ, 1997.

taken their inspiration of the premises of so-called postmodernity. This contextualization can perhaps make wider discussion possible, but this is not our objective here.

Perhaps we can think in parallel terms, basing ourselves on the recognized and respected work of Thomas Kuhn, developed in 1960s and 70s, "The Structure of Scientific Revolutions". This study brought us the concept of paradigm, applied to the history of science. Kuhn considered scientific advances that were universally recognized and that, during a particular period of time, provide model problems and solutions to a community of scientific practitioners as a paradigm. This reflection on paradigm shift that is so dear to the theory of knowledge emphasized that science in the academic world can be characterized primarily by the transmission of knowledge and application of already-existing models, since these models, to a certain extent, have already been recognized by the community of established scientists. In short, this is a conception according to which "a paradigm is that which members of a community share and, conversely, a scientific community is made of men who share the same paradigm.".[25]

Kuhn´s thesis is that the rejection of a theory can only take place through conflicting data within a scientific community. He supports this thesis on the fact that the history of science is made up of conflicts, polemics, crises and revolutions; that this is evidence of social, cultural and psychological problems that have to do with scientific development within a scientific community. [26] As a consequence, there are moments of rupture or of paradigm shift which create the possibility of changing both ways of thinking and strategies of rationality and which incorporate new social actions and dimensions of power/knowledge relations [27], the sexual division of knowledge,[28], gender relations, and others. [29]

The Kuhnian perspective tends to promote a drastic view of the rupture that the new paradigm provokes within a scientific community. For the author,when a scientific community repudiates an old paradigm, it simultaneously rejects the epistemological corpus and most of bibliographical production that embodies and legitimates it, which in this regard then ceases to be considered as a reference for scientific practice. Certainly, this does not mean that the rupture is abrupt and absolute. At the same time, we should consider that paradigm shifts, similarly to what Kuhn maintains, produce a science that is broader and potentially more accessible to women.

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[25] Thomas KUHN, 2003, p. 218.
[26] KUHN, 2003.
[27] Michel FOUCAULT, 1999.
[28] FOX KELLER, 1985.
[29] Joan SCOTT, 1998.

Fox Keller argues: « In particular, I attempted to understand the genesis of sexual and emotional work, so conspicuously present in my own generation, that labeled mind, reason and objectivity as masculine and heart (and body), feeling and subjectivity as feminine, and that therefore were at the root of women's exclusion from scientific endeavor. .[30]

In this regard, feminist thought has elaborated a critique of hegemonic scientific knowledge that had been a secular support for male domination, through reflections carried out around the following issues and approaches: the question of sex and gender difference ;[31], theories of moral development, women's views within research in psychology, women's image in medical and gynecological treatises and writing, the masculine monopoly of historical representation and women's invisibility in history[32], androcentric views of sexuality, [33] the image of patriarchy sustained by writing in the social science[34]s and in history[35], the invisibility of women in sociological analysis;[36] working women´s under-representation in social science research, the exclusion of women's voices in political theory[37], interpersonal conflict, aggression and violence [38]and the exclusion of women from science, among others.[39]

The totality of these analyses do not exhaust the wide amount of production on diverse themes and approachers. However, these authors and works exemplify, to a large extent, the main critiques and analyses carried out by feminist critique with regard to expressions of contemporary scientific knowledge, provoking dense dislocation and challenges to ways of thinking and doing scientific research.

Let us consider that changes in relation to epistemology and scientific theories occur within a scientific universe and are not free of the interactive influences of existing social and cultural processes, as the feminist,ecology and multi-cultural movments show. If on the one hand, the field of scientific practices, in addition to being "determined" within daily life by wider sócio-cultural dimensions, neither is it immune to the challenge of going beyond the limits imposed a hegemonic community of origin. To go beyond imposed limits is not easy,

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[30] FOX KELLER, 2006, p. 15.
[31] SCOTT, 1997.
[32] PERROT, 1984.
[33] Delphine GARDEY e Ilana LOWY, 2002; e Anne-Marie DEVREUX, 2002.
[34] Helena HIRATA, 1991.
[35] Célia AMOROS, 1985.
[36] Françoise COLIN, Evelyne PIESIER e Eleni VARIKAS, 2000.
[37] Fanny TABAK, 2002, e Eleni VARIKAS, 2002.
[38] Heleieth SAFIOTTI e Suely de ALMEIDA, 1995.
[39] Parte dessas contribuições está referenciada nos artigos publicados na obra editada por Mary McCarnney Gergen (*O pensamento feminista e a estrutura do conhecimento*) (GERGEN, 1993).

since the real and symbolic value of male presence and Exact Sciences – the so-called Hard Sciences – make themselves felt present systematically, as we have seen above in CNPq data.

Another example is the the proposal for the "Restructuration and Expansion of Federal Universities – Reuni Project[40]," which is currently being debated at the Brazilian Education Ministry as well as at several federal universities in Brazil, within the context of discussions on future structural and conjunctural changes within these institutions. This project has thirteen men working with the AdvisoryGroup, which is in turn responsible for the elaboration of the proposal. These men are all respectable scientists and researchers, with an authoritative masculine cognitive capacity that is broadly recognized; the majority of them come from hard sciences fields, particulary physics. Despite the fact that there is already an expressive number of women tenured professors in science who also command considerable professional recognition, there was not a single one included within the group. The group in charge of technical advice, which is considered of secondary importance, on the other hand, is composted of five members, three of whom are women.

It is true that women have entered the scientific field more slowly than men. But the elements and the strategies that provide the basic orientation regarding the definition of scientific problems, object of science (in this case, the changes proposed by the universities that do not involve only issues regarding the institutions, but fundamentally the processes dealing with the academic and professional preparation of future generations), overlap, on one hand, with social and historical processes that are complex, and on the other hand, with the maintenance of certain hegemonies relative to the field of scientific knowledge. With regard to the latter, political interests and cultural factors operate, linked to hegemonic groups whom, in conjunction with certain institutions and academics, end up producing more legitimated standards for the production of knowledge. The theories and methods produced by such standards do not always contemplate – in equitable way – the presence of women in science as well as in other dimensions of life.

Tavares, who is a technical adviser for the CNPq, emphasizes in her recent work that:

> There is a tendency for one sex or the other to dominate in many fields of knowledge. Men predominate in technology as well as in the so called hard sciences – engineering, the exact sciences and natural sciences – as well as in agrarian. There are a lower number of women, especially in Physics and in Mathematics. From the total number of engineering schools researched, in the DGP, women number approximately ¼ of the people researched and 1/3 of them in the field of exact sciences and agrarian sciences.

[40] The document entitled "Reuni" was available at the universities' sites http://www.unb.br as of August, 2007.

> Among the scholarships for productivity in research – PR, granted by the CNPq, the male profile is more accentuated: the percentage of participation among the women is even lower in the exact and natural sciences and engineering, representing approximately 1/5 for the total of people researched. Women dominate in the biological sciences and in the health field and they surpass the masculine among the recipients of scholarships for productivity in research[41].

This data reaffirms the absence of equity between men and women scientists/researchers in the social structure of the Natural Sciences[42]. The fact that there is higher number of women in the scientific world does not eliminate the fact that the higher the echelon, the fewer the women researchers. "Whether it is in the north or in the south, there are few women working in the most prestigious labs, being the chair of natural sciences, mathematics and engineering departments or occupying high positions in agencies and political organizations on an international level[43]." Furthermore, there is a given coincidence between those who are in charge of social, economic and political power and that therefore determine what is considered "true" and the possible changes in the scientific realm.

Although the sixties was seen as a landmark in the field of feminist studies, women engaging in scientific inquiry and in the production of scientific knowledge still faced the rigid hierarchy which often times prevented women's access to certain fields. This rigid hierarchy is due to the persistence of some assumptions and representations, and demand a break with the ideal of women seen as a "natural" object and as such deprived from the condition of reciprocity and therefore to being acknowledged as equals. It is difficult to subvert the relationship of male domination that persists within some academic fields and scientific production, given the invisibility of sexed assumptions present in scientific language which may reinforce certain images and stereotypes present in society.

There is a need to rethink history and social theory from a women's standpoint, through the usage of a gendered vocabulary. Therefore, feminist critical thought emerged as a novelty within academia and imposed itself as an innovative theoretical tendency with strong critical and political potential which, as of the 1970s, fueled the debate about women and science. Female scientists began asking to what extent science discriminates against women. « What still prevents women to participate in high echelons of science? », Schiebinger asks herself: "Did the exclusion of women in science have consequences for the content of science itself[44]?"

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[41] Tavares, 2007, p. 1-2.
[42] Harding, 2007.
[43] Harding, 2007, p. 164.
[44] Schienbinger, 2001, p. 205.

In historical tradition, we observe that the "social subject" appeared as a generic being, a subject that reflected a specific social type: the head of the household, the Western male, the wealthy male, heterosexual and always white. The motivations and moral and the rational style of this subject are ascribed to all social subjects, despite the empirical evidence that individuals have different motivations and utilize their own rationality.[45]

Nevertheless, there are countless researchers, thinkers, philosophers and scientists in academia that have intensified their criticism against the scientific practices which have disqualified women and denied their access to the scientific field and to a career in the sciences. Such absence is affirmed, for example, in situations such as the one we cite below :

> specialists indicated, to be used as standards of development, sexist concepts from the North, from European and North-American cultures, international agencies and transnational corporations, [applied] to societies from the Southern hemisphere and thus reducing the probability that women from the South could gain access to research benefits from C&T conceived in either in the North or in the South. Some deplorable examples of this discrimination were documented in works about health, agriculture, water, natural resources and the in the research about the environment.[46]

The advent of women's history[47] and its consequent relationship to daily life, to institutional public life and to the subjectivities of social life constitute examples that do not only imply the elaboration of new categories of analysis but also of new methods of investigation. Such elements contribute to the expansion of the fields of discussion, although feminist critique regarding the establishment of new perspectives of analysis has met resistance when facing the persistence of the dominant scientific paradigm.

Feminist critique has sought conceptual support from post-structuralists – Michel Foucault, Gilles Deleuze, Roland Barthes, Derrida and Julia Kristeva -, who intensified the discussion about the crisis and the decentralization of the notion of subject, introducing central themes to academic debate such as ideas on marginalization, otherness and difference. Together with feminist criticism, these themes have served as a theoretical framework for the social change produced by feminist critique which has offered new angles, new ways to see the world, to see common things and to open new cognitive spaces.[48] Therefore, feminist

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[45] Alison Jaggar, 2001.

[46] Harding, 2007, cited by Rosi Braidotti et al, 1994.

[47] Michelle Perrot, offered the first course entitled "Do women have a history?," in 1973. The title of the course in the question form translated our perplexities.

[48] Fox Keller, 2006.

thought has introduced new subjects as actors and new subjects as object of research in social theory, as well as contributions brought to the field of biology, which have affected the research agenda[49].

Contributions to science made by the feminist critique

In order to currently understand the criticism against a male oriented science, one must ask: What is masculinity in science? If the access of women to science is no longer an issue, what are the stereotypes and discriminations that still persist in relationship to women scientists? One of the hypotheses that may explain, in part, such a situation, evokes the differentiated process of socialization experienced by boys and girls in relation to the learning process and the code of behaviors that are tolerated or restrained and can, as a result, inform professional life.[50] In other words, a process of socialization that will lead to women distancing themselves from science as they are directed to activities that are regarded as "feminine," are extended later by life difficulties and constraints such as having to make a choice between family, maternity and a professional career.

Feminist critique has brought to the forefront the need to integrate women as a sociological and philosophical category in any analysis, thus pushing beyond a deficit that has impaired analysis of society and social relations. In this reagrd, it has overcome biological, geographic and social determinisms; it has broken with thought centered in dyads: subject/object, reason/emotion or imagination, nature/culture. These dyads are not compatible with the ontological dimension of the human being, because they negate all possibilities for interdependencies and rob human beings of their historicity. On the contrary, our thought must acknowledge the existence of all sexual subjects – man/men and woman/women and, and in addition, take their ethnicity, race and social positioning into consideration – configured as another ontological construction that has been spurred by research in the social sciences[51].

Many of the changes were introduced by female scientists themselves. On the field of biology, Fox Keller, affirms "[…] the entrance of women in the scientific field in large number made it possible for a 'feminine' perception of the world to find its place in science[52]."

[49] Kerr and Faulkner, 2003.
[50] Kerr and Faulkner, 2003.
[51] Jaggar, 2001.
[52] Fox Keller, 2006, p. 28.

Another contribution refers to the interpretation of classic authors in several academic fields, enabling a better understanding of strategies regarding the exclusion of women's experiences. If, on one hand, feminist thought formulated its first critiques as a reaction to the permanence of the patriarchal order which reduced women to invisibility and silence, on the other hand, it openly challenged the dominant thought, raising the question: do science and theory have a sex?

Feminist critique denounced the dominant paradigm that prevailed and enjoyed legitimacy in the production of knowledge, making as a counterpoint to naturalist arguments and to essentialist strategies imposed by dominant masculinist discourse. It provoked several displacements within scientific thought, its language, its lexicon, its conception of humanity and in the ethics of the subject and its social relations, as well as in the relationship between the individual and society[53].

This critique censors the fact the science is a meaningful locus to understand the conditions that affect the lives of men and women,[54] while at the same time it legitimizes many stereotypes and inequalities, such as androcentric practices dissimulated within models and strategies in scientific content, inside institutions and inside methodological and pedagogical practices.[55] Critique has been further extended to the incorporation of emotional and subjective dimensions of life as a way to exist and a way to know that the order of reason and objectivity is not exclusive to science ; this presupposes that knowledge can be produced by women as an extension of their heterogeneities. Therefore, social research becomes orchestrated by hypotheses and empirical categories framing the subsequent results and end up confirming the posture adopted *a priori*, in other words, « […] once a researcher has adopted a given ontology, this system of orientation determines what is relevant. The data cannot either correct nor falsify the ontology because all of it has been gathered from this perspective and can only be understood in these terms[56]."

The introduction of new perspectives of analysis as well as other ways of thinking breaks with dominant categories of social theory and expresses new paradigms in the production of knowledge, as well as the construction of new fields of knowledge and power. In other

[53] By the way, consult Francine Descarries, 1994.
[54] Alison Wylie, 2001.
[55] Wylie, 2001; Kenneth Gergen, 1993; and Descarries, 1994.
[56] Gergen, 1993, p. 50. In order to privilege a way of researching by women, as Hilary Rose, 1983, referred to as being "home made" work, in contrast with the masculine form of "industrialized work." She definies homemade work people's manual, mental and emotional activities, which are all unified, as opposed to being fragmented, abandoning the mistaken Cartesian dualisms, such as mind *versus* body, reason *versus* emotion, etc, thus doing way with the masculine preoccupation with reductionism and linear thinking and replacing it with a holistic view and complex interdependencies.

words, its contribution implies an openess to otherness, a denial of any perspective that is essentialist and binary. It contemplates the space inhabited by the pluralistic experiences of women, constitutive of the social experience of modernity, as well as the emergence of new thematic and categories derived from such experiences. It is worth mentioning that feminist theory, by incorporating otherness, does not restrict itself exclusively to women, but includes other subjects excluded by great Enlightenment discourse.

Feminist critique, the gender system and science

Perhaps it is less ambitious to try to change science than it is to try to change the world.
Fox Keller

The changes brought by feminist critique may be systematized because the condition of

> Gender makes a difference to women in science not only because of what they bring with their bodies - and sometimes not even because of what they may bring because of their socialization-, but because of the perception science brings to the community about women as well as about gender – and, in turn, because of what such perceptions bring to the common values of popular scientific disciplines.[57]

Science does not have a gender in its *ethos* and its substance,[58] although it is known that gender is present in cultures and scientific subcultures.

The changes evoked by feminist critique, based on the notion of gender, has produced new angles and new cognitive modes of approaching the world. It is known today that social as well as natural history have been organized in terms of the significance ascribed to gender, and according to this context, institutions that incorporate gendered meanings have been built.[59] In other words, feminist critique has a new dialectic made evident by deconstructing the supposed biological base that attempted to explain masculine and feminine behaviors and asserting that gender results from social and cultural constructions. As a consequence, this new dialectic present in social customs, new behaviors, language and the gaze brings changes regarding the condition of existence of men and women and between them, respectively. In other words, the effect of the gendered condition reveals itself in the types of relations it produces (or that is able to produce) between men and women, which in good measure, are a result of social and cultural processes. It is from that point that both the relationship established with science and the type of professional and institutional engagements change.

[57] Fox Keller, 2006, p. 29-30.
[58] Schiebinger, 2001.
[59] Harding, 1996.

It is important to register that the cultural changes introduced by the category of gender as they occurred not only within social theory, but also within the domain of biological sciences[60], for example, did not presuppose that the concept of gender would be a primordial factor in the social and scientific development, neglected by the history of science whose importance would also be revealed by feminist critique.

Gender as a category centers itself around the identities of the subjects that it brings together, constituted by a sense of belonging to different social-cultural collectivities which are nonetheless super-imposed and defined not only by biology, history or geography, but above all, by cultural categories, such as race/ethnicity, social class, religious belief, and generation, among others.[61] Feminist critique, in disseminating the concept of gender as a *situated knowledge*, established in the historical and social relations, in the unequal power relations involving men and women, offers a new way to look at reality, making it possible to locate the distinctions between characteristics considered masculine and feminine present at the core of the hierarchies of the social world as well as the world of knowledge, whose gender markers have been dislocated to social theory.

The concept of gender as the unfolding of feminist critical thinking has made its own headway in the scientific field, in academic research, as well as in the political and institutional arena. What makes it attractive and potentially fruitful is the nature of a perception that lends itself to the reading and the comprehension of the social and cultural systems in which is anchored. In the scientific field the relative weight of the condition of each gender may vary in relationship to the values present in each scientific and/or academic field, in the different institutions and groups.

Gender as an analytical category has been, on the one hand, an instrument of critical analysis about the presuppositions that inform the main paradigms guiding social theory, not only in the sense of understanding the relevance of gender relations in the organization of social life, but also how it affects the extension of the knowledge produced by the sciences. On the other hand, the category is known for its "transversal" component, whose presence becomes important in any project of scientific, institutional and social-political development that has interacted with academic institutions and with social movements, such as public institutions and international forums, in common and interactive affiliation, creating a new vocabulary and new spaces of interaction between actors in the scientific field and the

[60] Fox Kelley, 2006.
[61] Marilyn Friedman, 2001.

political-institutional, as well as making it possible for questions of reflection and study to arise.

Conclusion

The "innovations" and "contributions" brought about by the feminist critique of science do not only introduce new theories and concepts. Above all, they have invited reflection on themes; emphasized forgotten dimensions of interest to women (such as abortion) but that now attracted the attention of scientists, researchers, philosophers and religious leaders. Starting in the seventies, abortion became a question of philosophical and religious interest, with the movement for its decriminalization in Western countries which touched directly upon one of the pillars of the patriarchal structure: the family.[62]

Feminist critique has sought to eliminate women's condition of subordination regarding their sense of belonging in the scientific field, regarding different forms of oppression, not all of which are explicit, that are exercised over women's abilities, their reflections and points of view. Thus, feminist critique has alerted us to the fact that scientific knowledge is not an objective entity; after all, it is part of the cultural condition of its social actors. Its production cannot take place as an abstract activity, distant and isolated, above all because "how can it have adequate and conventional standards of objectivity, if on countless occasions it has permitted a description of the biological and social inferiority of women?", asks Sandra Harding.[63] On the contrary, it should constitute a scenario made up of the multiplicity and the diversity of the actors, actions, activities, social networks, interactions, coming together and moving apart. What attracts attention is not the absence of social actors, but the absence of a certain type of social actor – women- and the determinant role the other actors also have to play because of the absence of women and of these actors in the field of research. This is an obstacle that cannot be ignored, as mentioned by Descarries.[64]

Feminist critique has provoked a significant epistemological rupture by claiming that the private domain, in its personal existence, is also political, that there is no political problem that does not end up affecting the personal/private and that such relations interfere with the scientific practice. The corollary of the visibility of the private gains importance for

[62] Another contribution refers to the presence of the *conflict element* present in the social relations of sex, exploding in the framework of binary analysis that extends to the production of knowledge, that manifests in the articulations and inter-relations present in the social set. In an attempt to understand the violence suffered by women, a feminist reflection faced the production of many explanations..
[63] Harding, 2007, p. 165.
[64] Descarries, 1994.

scientific practice, centered on patriarchy - the sexual division of work, the relationship between the sexes/genders, the relationship between social classes, the categories associated with individual and collective appropriation of women and particularly in manifestations of social control (domestic violence, incest, rape, sexual mutilation, prostitution, pornography) - are regarded a priority as themes as well as research agenda.

In research activities, feminist critique has contributed in refuting the theoretical and empirical formulations that exist by questioning androcentrism, which marks the models and concepts of social sciences. It has also made an epistemological critique of the notions of neutrality and objectivity as methodological illusions. As Descarries[65] points out, it acknowledge the importance that the subjectivity of the researcher has in relationship to the set of phases in the production of knowledge process.

Feminist critique has redefined the concepts of social reproduction, of sex roles, of discrimination/inequality, among others, in function of the many concepts, categorizations, cultural and symbolic lineages, as well as many different groups and institutions, object of knowledge. Some presuppositions oriented this new discussion including questions not only regarding women, but men as well.

Such criticism and presuppositions have led feminist researchers to more rigorously defend and follow the rules (theoretical-empirical) of a research method that is also scientific. When opting for methodological proceedings that are more "alternative" and that invoke criticism and doubt, feminist critique has served (indirectly) to question traditional ways of doing research, its blindness concerning women, as well as casting doubt on the conceptual premises of the conventional hypotheses that structure the logic of positivist investigation.

From a methodological stand point, the rupture unleashed by the feminist critique, has not only produced a revision of scientific models that function hierarchically but has also questioned the presence of certain hegemonic presuppositions underlying scientific research. It is a rupture that proposes to explore conceptual and methodological paths whose reflections may contribute to highlighting the interests and efficacy of pluri-disciplinary approaches favoring newly equitable gender conditions of in the production of scientific knowledge. Concomitantly, it signifies an attempt to integrate many reflections with women's experiences, guided by the intention of producing a type of knowledge that is shared with *others* and with the social reality.

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[65] Descarries, 1994.

In conclusion, it may be worthwhile to cite a excerpt of the interview with the feminist Lise Disch[66] about the contribution of the German philosopher Hannah Arendt, regarding feminist critique:

> IHU On-Line – How current is Arendt´s thought as a contribution to the establishment of a political and feminist ethic?
>
> Lisa Disch – Arendt's ideas and the plurality – the equality among all in their diversity -, the ability to start something anew - inspired many feminists, including myself. Furthermore, as Nancy Hartsock argued some years ago, Arendt has a cooperative and inter-subjective notion notion of power as action that has been fruitful for feminist thought. Although what Arendt said regarding politics has been very inspiring to the feminists, we can only go so far with a thinker like Arendt who makes it difficult to analyze relations of power through a gender lens.
>
> IHU On-Line – What about the political participation of women, does the Arendtian philosophy serve as a parameter and as an inspiration in this regard?
>
> Lisa Disch – Yes, but neither more nor less than it would for anyone else.[67]

Bibliography

AMOROS, Celia. *Hacia una crítica de la razón patriarcal*. Barcelona: Editorial Anthropos, 1985.

BRAIDOTTI, Rosi et al. *Women, the Environment, and Sustainable Development Atlantic Highlands*. London: Zed Books, 1994.

COLIN, Collin; PIESIER, Evelyne; VARIKAS, Eleni. *Les femmes de Platon à Derrida, anthologie critique*. Paris: Plon, 2000.

DESCARRIES, Francine. "Les études féministes... nouveaux savoirs, nouveaux pouvoirs". *Revue de Groupe Interdisciplinaire d'Étude sur les Femmes*, Bruxelles, Université Libre de Bruxelles, v. 2 Été, p. 19-32, 1994.

DEVREUX, Anne-Marie. "Sociologie contemporaine et re-naturalisation de féminin". In: GARDEY, Delphine; LÖWY, Ilana. (Dirs.). *L' invention du naturel. Les sciences et la fabrication du masculin et du féminin*. Paris: Editions des Archives, 2002. p. 125-135.

DIAS, Maria Odila da Silva. *Teorias e método dos estudos feministas (perspectiva histórica e hermenêutica do quotidiano*). São Paulo, 1990. Mimeo.

DISCH, Lise. *Hannah Arendt and the Limits of Philosophy*. New York: Cornell University Press, 1994.

[66] Lise Disch is a philosopher. She teaches at the Political Science Department at Minnesota University, in the United States. Some of her specialties are: political theory, history of political thought, feminist theory, electoral processes and democratic theory, among others. She earned a Ph.D. at the Rutger University, USA. She is the author of many books, among them: Hannah Arendt and the Limits of Philosophy (Disch, 1994. She received much academic recognitions for her research. The most recent prize was the Arthur "Red" and Helene B. Motley Exemplary Teaching Award, in 2001-2002.

[67] This is available at <http://www. unisinos.br/ihu. Access in August, 2007.

FOUCAULT, Michel. *A ordem do discurso*. São Paulo: Loyola, 1999.

FOX KELLER, Evelyn. “Le/la scientifique: sexe et genre dans la pratique scientifique”. In: FOUGEYROLLAS-SCHWEBEL, Dominique; ROUCH, Hélène; ZAIDMAN, Claude (Coords.). *Sciences et Genere. L´activité scientifique des femmes État-Unis, Grande Bretagne, France*. Paris: Université Paris VII − Denis Diderot, 2003. p. 83-97. (Collection des Cahiers du CEDREF).

_____. “Qual foi o impacto do feminismo na ciência?”. In: LOPES, Maria Margareth (Org.). *Cadernos Pagu: Ciência, Substantivo Feminino Plural*, Campinas, SP: Núcleo de Estudos de Gênero, Universidade Estadual de Campinas, n. 27, p. 13-34, jul./dez. 2006.

_____. *Reflections on Gender and Science.* New Heaven: Yale Universty Press, 1985.

FRIEDMAN, Marilyn. “El feminismo en la ética. Las concepciones de la autonomía”. In: FRICKER, Miranda; HORNSBY, Jennifer (Dirs.). *Feminismo y filosofía. Un compendio.* Barcelona: Idea Books S.A., 2001. p. 223-242.

GARDEY, Delphine; LOWY, Ilana. "Introduction". In: _____. (Dirs.). *L´invention du naturel. Les sciences et la fabrication du masculin et du féminin*. Paris: Éditions des Archives Contemporaines, 2002. p. 9-28.

GERGEN, Kenneth J. “A crítica feminista da ciência e o desafio da epistemologia social”. In: GERGEN, Mary McCarnney (Ed.). *O pensamento feminista e a estrutura do conhecimento.* Rio de Janeiro/Rosa dos Tempos; Brasília/EdunB, 1993. p. 48-69.

GERGEN, Mary McCarnney. *O pensamento feminista e a estrutura do conhecimento*. Rio de Janeiro: Rosa dos Tempos: Brasília/EdunB, 1993a.

HARDING, Sandra. *Ciência y feminismo*. Madrid: Ediciones Morata, 1996.

_____. “Gênero, democracia e filosofia da Ciência”. *Revista Eletrônica de Comunicação, Informação e Inovação em Saúde*, Rio de Janeiro, v. 1, n. 1, p. 163-168, jan./jul. 2007.

HEILBORN, Maria Luiza (Org.). *Sexualidade. O olhar das Ciências Sociais*. Rio de Janeiro: Jorge Zahar Ed., 1999.

HIRATA, Helena. "Organização do trabalho e qualidade industrial: notas a partir do caso japonês". *Estudos Avançados*, São Paulo: Universidade de São Paulo/Instituto de Estudos Avançados, p. 34-78, 1991.

JAGGAR, Alison. “El feminismo en la ética: la justificación moral”. In: FRICKER, Miranda; HORNSBY, Jennifer (Dirs.). *Feminismo y filosofía. Un compendio*. Barcelona: Idea Books S.A., 2001. p. 243-262.

KERR, Elizabeth; FAULKNER, Wendy. “De la visión de Brockenspectres. Sexe et genre dans la science de XX siècle”. In: FOUGEYROLLAS-SCHWEBEL, Dominique; ROUCH, Hélène; ZAIDMAN, Claude. *Sciences et genere. L´activité scientifique des femmes État-Unis. Grande Bretagne, France*. Paris: Université Paris VII – Denis Diderot, 2003. p. 45-76. (Collection des Cahiers du CEDREF).

KUHN, Thomas S. *A estrutura das revoluções científicas*. São Paulo: Perspectiva, 2003.

LOPES, Maria Margareth. “Sobre convenções em torno de argumentos de autoridade”. In: LOPES, Maria Margareth (Org.). *Cadernos Pagu: Ciência, Substantivo Feminino Plural,* Universidade Estadual de Campinas, Campinas, SP, n. 27, p. 35-61, jul./dez. 2006.
PEIFFER, Jeanne. “Femmes savantes, femmes de sciences”. In: *Le sexe des sciences. Les femmes en plus. Autrement*, Paris, n. 6, Oct. 1992.

PERROT, Michelle. (Dir.). *Une histoire des femmes est-elle possible*? Paris: Rivages, 1984.

RAYNAL, Florence. “Les femmes dans la France”. *Label France*, Paris, n. 37, out. 1999. Disponível em: <http://www.ambafrance.org.br/abr/label/label37/dossier/01perrot.html>. Acesso em: fev. 2008.

ROSE, Hilary. “Hand, Brain and Heart: A Feminist Epistemology for the Natural Sciences”. *Signs*, New York, n. 1, p. 73-90, 1983.

ROUCH, Hélène. “Présentation”. In: FOUGEYROLLAS-SCHWEBEL, Dominique; ROUCH, Hélène; ZAIDMAN, Claude. *Sciences et genere. L´activité scientifique des femmes État-Unis, Grande Bretagne, France*... Paris: Université Paris VII – Denis Diderot, 2003. p. 11-21. (Collection des Cahiers du CEDREF).

SAFFIOTI, Heleieth I. B.; ALMEIDA, Suely Souza de. *Violência de gênero: poder e impotência*. Rio de Janeiro: Livraria e Editora Revinter, 1995.

SCHIEBINGER, Londa. *O feminismo mudou a ciência?* Bauru/SP: EDUSC, 2001.

SCOTT, Joan. “Género: una categoría útil para los estudios históricos?”. In: LAMAS, M. (Org.). *El género: la construcción cultural de la diferencia sexual*. Cidade do México: PUEG, 1997. p. 265-302.

_____. “Las querelles des femmes in the late Twentieth Century”. *Differences: a Journal of Feminist Cultural Studies*, Duke University Press, v. 9, n.2, p. 70-92, 1998.

SORJ, Bila. “Novo paradigma feminista ou sociologia das teorias feministas?”. In: XXI ENCONTRO DA ANPOCS, out. 1997, Caxambu. Mimeo. Apresentado na mesa-redonda “As análises de gênero constituíram paradigmas metodológicos?”.

_____. *O laboratório de Pandora. Estudos sobre a ciência no feminino*. Rio de Janeiro: Garamond, 2002.

TAVARES, Isabel. *Mulheres na Ciência*. Brasília, CNPq, 2007. Mimeo.

VARIKAS. Eleni. “Naturalisation de la domination et pouvoir légitime dans la théorie politique classique”. In: GARDEY, Delphine; LÖWY, Ilana. (Dirs.). *L’ invention du naturel. Les sciences et la fabrication du masculin et du féminin*. Paris: Editions des Archives Contemporaines, 2002. p. 89-108.

WYLIE, Alison. “El feminismo en la filosofía de la ciencia: dándole un sentido a la contingencia y a la limitación”. In: FRICKER, Miranda; HORNSBY, Jennifer (Dirs.). *Feminismo y filosofía. Un compendio*. Barcelona: Idea Books S.A., 2001. p. 181-199.

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