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## **Portraying gender \*\***

### **(1) Research group: Gender and Science**

This is the first research that studies the development of the concept of gender in the ‘teaching and ‘research’ disciplines at the Greek universities and research centers. Point of departure for the research was the question whether and in what way a) the symbolism of gender, b) the gendered social division of labour and c) the construction of gendered identity have influenced the history and the philosophy of science.<sup>1</sup> In our research, gender is not received as a factor that simply pinpoints differences between women and men. Gender is perceived as the referential-analytical category and not as a descriptive concept. Moreover, it is defined through two interdependent versions that it entails: on one side gender composes a component of the social relationships that are based on perceptual differences between women and men and on the other hand it is the primary way for the signaling of power relationships between them.<sup>2</sup>

The use of this concept of gender in the approach of science allows for the prominence of asymmetry — actual and symbolic — and ends up in something more than the description of reports and the display of statistical evidence on the participation of women in the different scientific communities.<sup>3</sup> Gender entails analytical dynamics for the understanding of the interdependence that exists both between the cognitive and social side of science, and in the relationships between science and society. It does not just comprise a tool for critical analysis and interpretation of the social side of science, but also a category of analysis of the methods used in science.<sup>4</sup> In order to understand this phenomenon, we researched the epistemological conditions that render problematic the osmosis of gender and science, per scientific field / discipline, applying a multilayer research strategy. The wide thematic amplitude, and the fact that the issue of gender and science is explored in such a way for the first time in Greece, constitutes a very wide framework, which has dictated different ways of project consideration and the adaptation of five different methodological approaches.

The aims of the research could be summarized in the following questions:

1. What are the reasons behind the unequal development of gender issues between social and physical sciences?
2. Which are the epistemological stereotypes that impede the incorporation of gender as an analytical category in physical sciences mostly?

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<sup>1</sup> Lada, A., (1989), “Interview with the physician E. F. Keller: Thoughts concerning gender and Science”, *Dene*, vol. 4, pp. 62–67.

<sup>2</sup> Griffin, G. & Braidotti, R. (eds) (2002), *Thinking Differently: A Reader in European Women’s Studies* (London: Zed Books); Diane Richardson & Victoria Robinson (eds.) (1993), *Thinking Feminist. Key concepts in Women’s Studies* (New York: The Guilford Press).

<sup>3</sup> Harding. S. (1986), *The Science Question in Feminism* (Cornell University Press: Ithaca, London).

<sup>4</sup> Keller, E. Fox (1985), *Reflections on Gender and Science* (Yale University Press: New Have, London); Longino, H. (1990), *Science as Social Knowledge: Values and Objectivity in Scientific Inquiry* (Princeton University Press: Princeton, NJ.); Schiebinger, L. (1999), *Has Feminism Changed Science?* (Harvard University Press: Cambridge, Mass.)

3. What sort of epistemological subversions have occurred in social as well as in physical sciences that have developed these specific issues?
4. What are the transformations that have occurred on a level of epistemological discourse, theory, methods and research objectives as well as on a level of scientific practice, including the physical space of scientific action?

The five different methodological approaches that we have adopted are listed below:

- (A) *Courses of Gender and Equality* in the undergraduate studies' programme at Greek universities: a comparative and synchronic approach. We collected, analyzed and evaluated the studies' programme coming from selected university departments in Greece, from both the field of social and natural sciences. We recorded the courses that either study the analytical category of gender or adopt the gender perspective or acknowledge the theme of gender in their title.
- (B) *Quantitative and qualitative method of collection* of data for the study of the contribution of gender in the social and natural sciences: We explored the role of the concept of gender upon the teaching and research activity at various departments (Sociology, Philosophy and Pedagogy, Psychology, Primary and Preschool Education, History-Archaeology, History and Ethnography, Social Policy and Social Anthropology, Social Anthropology and History, Architecture, Geography, Philology) through verbal interviews with the teaching and research staff and through online questionnaires. In-depth interviews (the qualitative method of collecting data) with the teaching and research staff of the Universities explore the question of science and gender, their views on interdisciplinarity and on the consequences of the incorporation of the gender perspective in the different scientific disciplines. In parallel, the online questionnaire (the quantitative research method) captures information about courses, students' participation, the changes that the gender perspective has introduced in the content of teaching, as well as information about teaching strategies and evaluation.
- (C) *Study of natural sciences* and principally of nuclear physics, in Greece, from the end of 1950s until 1980: we studied the development of natural sciences in Greece and especially of nuclear physics beginning at the end of the 1950s until 1980, employing gender as the principal analytical category. The research focuses on the operation of the National Research Center of nuclear physics "Demokritos" and the dynamics of the gendered relations that developed around the experimental laboratory. Data collection is based on in-depth interviews with researchers, as well as on printed material and archives of the center.
- (D) *Recording of the movement of the Women's Studies group*: we recorded the activities of the Women's Studies Group (W.S.G.) at the Aristotle University of Thessaloniki (1983–2003). The research is based on interviews with the members of the W.S.G., on material published in the course of its activities within as well as outside of the university, and on press publications on some of those activities and / or on the positions of the group regarding the content, the aims, the breakthroughs, the possibilities and the prospects of Women's Studies in Greece and internationally.
- (E) *The document of photography as research tool*: the innovation of the research lies in its appeal to photography as historical source and not as a mere medium of illustration of a monograph or a text. The photographs reconstruct the space, the relationships, the hierarchies and the material culture of the scientific field that they represent. Within its framework, this research project ventures the collection of photographs depicting laboratory spaces both at universities and in other scientific institutions and research centers during the period of 1920–1980.

Thereafter follows a presentation of part of the total research in progress. Two out of the five methodological approaches are chosen, the interviews along with the on-line questionnaires, and the photography. The contemporary results collected from interviews and the on-line questionnaires (quantitative and qualitative method) are used as a baseline for the study of the role of the concept of gender at the Greek Universities, where the photographic material (photography as research tool) offers the retrospective review. This parallel exploration allows us to scrutinize the stereotypes that support the dominant epistemological paradigm in natural and social sciences.

## (2) Quantitative and qualitative method of collection of data

The role that the concept of gender plays in the teaching and research activity at the departments of social and natural sciences — such as Sociology, Philosophy and Pedagogy, Psychology, Primary and Preschool Education, History-Archaeology, History and Ethnography, Preschool and Elementary School Education, Social Policy and Social Anthropology, Social Anthropology and History, Architecture, Geography and Philology — was studied through online questionnaires. In parallel, there were executed interviews with faculty members which dealt with the question ‘science and gender’, their views on subjectivity and interdisciplinarity, the consequences of the introduction of the gender perspective in the various disciplines, as well as with the interpretation of the reason why the main strain of the majority of female students choose social sciences and the majority of male students study natural sciences.<sup>5</sup> Lastly, they were asked concerning the way in which the social roles of men and women affect science. For the scope of this paper we will focus on the on-line questionnaire only, which was uploaded on the website of the Interdisciplinary Undergraduate Programme in Issues of Gender and Equality at the Aristotle University of Thessaloniki.<sup>6</sup>

Until now, we have collected data from twenty-one courses regarding gender. The data refer to some information concerning the instructor as well as the course such as the title, the tuition years, the course status, students’ participation, changes that the introduction of the perspective of gender has brought to the content of tuition, the teaching strategies and the evaluation. It is worth mentioning at this point, that from the hundred and twenty people that were asked to fill out the online questionnaire, only fourteen people responded, out of which twelve were women and two were men. As shown in Figure I, the courses were offered mainly on the undergraduate level, at the various departments. Additionally, from the total of the twenty-one courses<sup>7</sup> within the course schedule eighteen were electives, whereas only three were required. In reference with the changes that the perspective of gender introduced to the content of instruction, the teaching approach and the method of evaluation of the courses, the answers of the teaching staff are depicted in Figure II that follows. Most people responded that that gender perspective brought changes especially on the way they used to evaluate the course but the differences concerning the content of teaching and the teaching mode do not seem statistically significant.

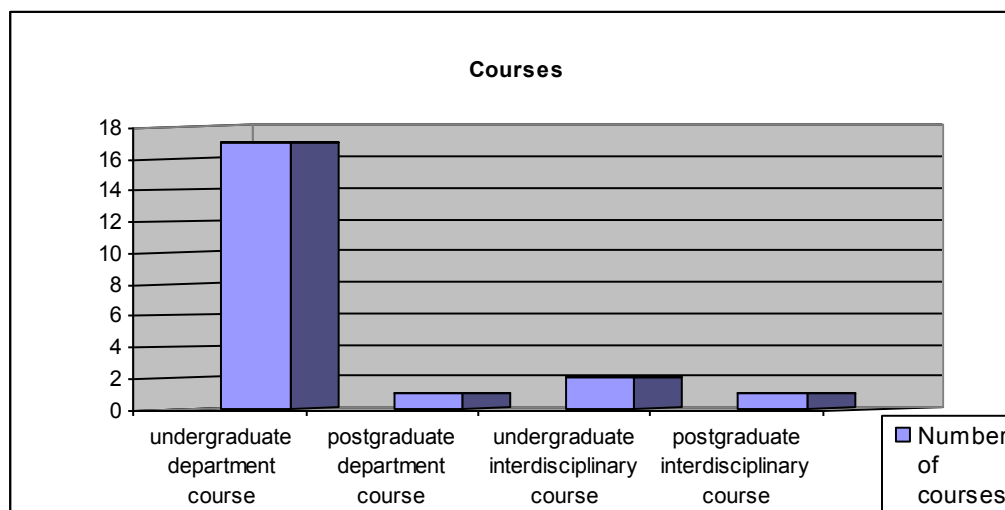


Figure I: Courses about gender taught at Greek Universities

<sup>5</sup> This tendency is observed at the Greek universities, perhaps not exclusively, even nowadays.

<sup>6</sup> See: [http://web.auth.gr/genderstudies/quest\\_application/index.php](http://web.auth.gr/genderstudies/quest_application/index.php).

<sup>7</sup> Some of the tutors are teaching more than one course.

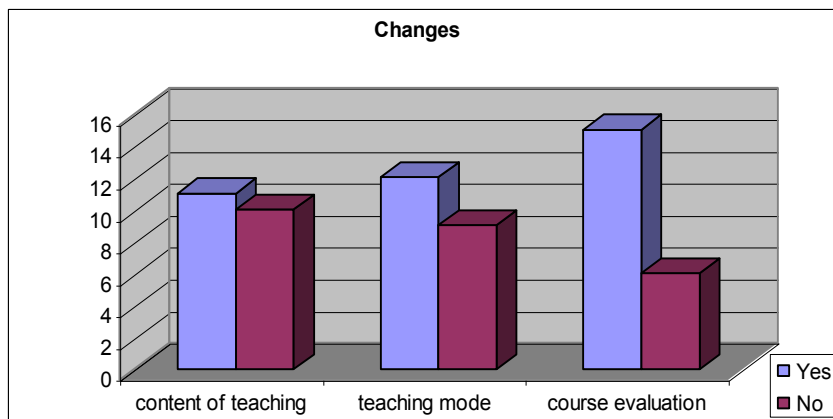


Figure II: Changes from the integration of gender perspective

### (3) Photography as research tool

In this part of the research we discuss the continuously changing role of men and women through laboratory photographs from Greek universities and research centers of the period 1920s–1980s, that allow us to study the stereotypes that support the dominant epistemological paradigm in natural and social sciences. These photographs act beyond their illustrative character as historical evidence, aiming to understand the structure of space, relations, hierarchies, and the material culture of the discipline. Our study uses the photograph as documentation in order to build on an argument of the meaning of gender in science through the practical side of science and not the theory behind it. Indeed, the photographs depict the material culture of the laboratory (such as instruments, organization of space and the space type itself) that reflect gender hierarchies and politics within laboratories and the respective strategies of epistemic control over the performed experiments. The images attempt to portray gender identities in relation to the way science is being ‘made’. In turn, the way science takes place is portrayed in relation to the space it is placed.<sup>8</sup>

#### On photography

The appeal to photography is one that views pictures as historical source and not as a mere medium of illustration of a monograph or a text. As Susan Sontag phrases in her book *On Photography* “a photograph is a thin slice of space, as well as of time”.<sup>9</sup> Pictures retain the power of capturing an event, a person, a situation at a specific point of time, in order to show or withhold a fact, fulfilling the need for reassurance of a certain reality and building on the experience depicted. The notion of what a photograph should be, as well as of the way a photograph is taken and of the hierarchy of the subjects that are captured, change over time. In any case, the photograph captures the world, both as it is and as it is shown and therefore provides ‘evidence’ of it. The world becomes available for evaluation.<sup>10</sup>

The collection and critique of the photographs become the basis for the investigation of the issues of identity, hierarchy, gender. The space that these photographs depict both reflects the situation prevailing in it and defines the behavior of work in that space: the kind of science, the way it is executed, the structure of scientific work, the perception of science and the scientist(s) overall and the change in all these aspects of science over time. Indeed, in the period of 1920–1980 much seems to have changed in the act of science in Greece. In the sixty years that we propose this research to cover, the conditions of scientific production and teaching, as well as the temporal, technological and even social limitations of science especially in the natural sciences, have changed dramatically. Immediate and drastic affects of these changes are to be observed in the spaces in which science is made. In fact, not only the form

<sup>8</sup> Forgan, S. (1989), “The Architecture of Science and the Idea of a University”, *Studies in History and Philosophy of Science* 20 (40), pp. 405–434.

<sup>9</sup> Sontag, S. (1973), *On photography*. Trans. to Greek by H. Papaioannou (FOTOgrafos: Athens), p.32.

<sup>10</sup> *Ibid.* p.108.

and shape of these spaces changes, but more importantly their meaning(s), the notion of the scientific laboratory, and therefore its operation.<sup>11</sup>

### On space

Due to the fact that the concept of the laboratory has not been stable in time nor remains the same in every scientific field, we include laboratories-studios (next to the ones of natural sciences) of Schools of Architecture and the Arts, as well as laboratories-anatomy rooms of Medicine Schools. In fact, the Greek word ‘εργαστήριο’ embraces both the idea of a laboratory (a place equipped for experimental study in a science or for testing and analysis<sup>12</sup> and the idea of an atelier / studio (a place for the study of an art),<sup>13</sup> both places of work and testing ideas. Nevertheless, either as the space of pioneer and creative work or as the space of transmission of already gained knowledge, the scientific laboratory has been located over time ranges from self-made ‘huts’, like in the case of the first years of function of the National Centre for Scientific Research in Athens ‘Democritos’, and in high standard university buildings. In any case, the photographs of the research depict who used to have and currently has access to science.<sup>14</sup>

The place of scientific work has also been a ‘mental’ scientific space. The experiment, the ‘precision’ of the experiment, the repetition and the conditions of ‘sterilization’ compose some of the aspects that borrow and are borrowed by the specific spatial composition of the places of the experiments. In some cases, the photographs seem to be part of and filed in this system of labeled information, clean and ordered, taken with a clear purpose and method.

There is a series of photographs that seem to act as an advertisement of the clean, geometric, equipped spaces that science should be taking place. One could separate these photographs in two kinds, the ones depicting the space of theoretical teaching, the classrooms, and the others picturing the place of practical knowledge, the laboratories. The majority of the classrooms are photographed from the seat of the professor mostly from the centre of the room looking down or far back onto the students’ seats, controlling them all visually, but also with the knowledge he / she has the power of transmitting. Even labels of photographs indicate that the space has gained importance because the specific professor had taught there, as the space became a testimony to the load of valuable contribution this professor gave to society. Alternatively, the pictures depict the room from the very far back of the room, placing the professors’ seat as a distant place, which is hard to reach, literally and hence metaphorically.

Laboratories are presented as representations of the science they facilitate. They are very organized as spaces, where everything seems to have its specific place and label. On one hand, they appear to be large spaces that allow the scarce equipment they host to operate in the precision that corresponds to scientific reports (figure III). On the other hand, we find spaces in which much knowledge can be stored, with equipment and findings stuck as densely as all the information needed to operate or decode them. Void of people, and shot mostly from the centre of the space, these pictures almost become “a way of immobilizing reality”,<sup>15</sup> of heightening the austere and absolute character of science, not only distant from women, but from the human mortality altogether.<sup>16</sup>

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<sup>11</sup> Ainley, R. (ed.) (1998), *New Frontiers of Space, Bodies and Gender* (Routledge: London).

<sup>12</sup> <http://www.webster.com/dictionary/laboratory> (2006), *Merriam Webster Dictionary*.

<sup>13</sup> <http://www.webster.com/dictionary/studio> (2006), *Merriam Webster Dictionary*.

<sup>14</sup> Findeln, P. (1999), “Masculine Prerogatives: Gender, Space, and Knowledge in the Early Modern Museum”, in: Galison, Peter and Thomson, Emily, *The Architecture of Science* (Cambridge: The MIT Press:Mass), pp. 29–57.

<sup>15</sup> Sontag, S. (1973), *On photography*. Trans. to Greek by H. Papaioannou (Athens: FOTOGrafos), p. 153.

<sup>16</sup> Latour, B., & Woolgar, St. (1986), *Laboratory life: The construction of scientific facts* (Princeton: University Press; 2nd ed.).

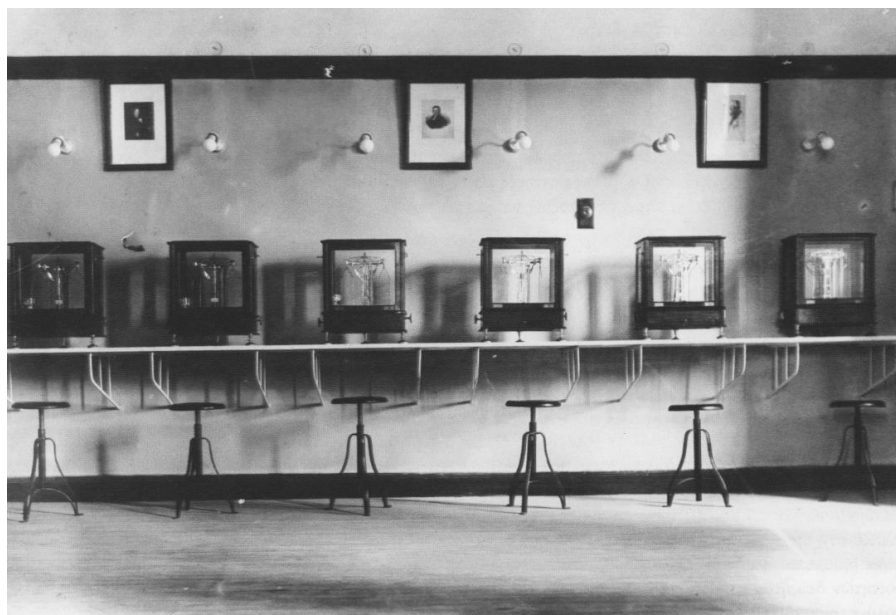


Figure III: Scale room, Aristotle University of Thessaloniki, 1957

Other pictures illustrate the way the spaces or the equipment were used. Most of the time, the picture is set in such a way so that the scientist, one or three at most, is in the middle of the photograph, holding the power to operate the machinery, or surrounded by his students, holding the power of knowledge. Always perfectly dressed and perfectly sat, (regardless whether he / she is in the space of work or at university events) the scientist seems to reflect the straightforward way of dealing with issues in science, clean cut, focused, with a clear purpose and specific results. The space too, becomes a further extension of the experiment.

Where students are depicted to ‘make science’ the equipment takes a prevailing role in the photograph, as if they control the students and not the opposite. In the case of the research centre Democritus, where female scientists appear to operate machinery, their role is again assistive, not as women but as scientists, in comparison to the machines they operate (figure IV).



Figure IV: National Centre for Scientific Research ‘Demokritos’, Athens, 1960s

In more than one instance, women are used in photographs advertising science or a new equipment or space as models for the aesthetics of the picture, in comparison to the respective photographs of men, shown in action, as the executers of tough, applied and creative work. Nevertheless, in many

photographs, the machinery is positioned in the centre and the full surface of the photograph, defying even the space they are positioned in. Then, the equipment, i.e. facilitators of the experiments, representing the practical aspect of science, dominates the photograph, and hence the science world.

### **On the scientist**

Photographs play a key role to the illustration and structure of memory and nostalgic reminiscence, but also in the construction of importance of the subjects depicted over the ones that were not captured by the photograph. The ‘occupiers’ of those spaces that are documented by the camera gain a specific character depending on their position and action in the photograph. The proprietary title and dominant position of the ‘researcher’ or the professor is located in the absence of an assistant or in the selection of placement of men and women in the space for the photograph. Also, the time period when women start to make an appearance in laboratories is to be noted. For instance, no women are depicted in photographs in scientific places in the beginning of the 19th century and if so, their role is accompanying to the scientists. In the 20th century women start to make an appearance, even though at times only as the assistants. Female scientists usually come in the picture as either exemplified and therefore placed in the visible, protective centre as the odd example, or are pushed behind hidden in the overpowering number of men researchers. Even though that has not always been the case, examples of this exist even nowadays.

Furthermore, the continuously changing role of the scientist is to be noted in the photographs. It shifts documenting the identity, the position and the gender of the students.<sup>17</sup> The researcher is changing social status, evidently moving away from the isolated and devoted ‘crazy’ scientist to the ‘professional’ scientist (figure V). Accordingly, the space where their photograph is taken differs; from the laboratory amongst equipment to the grand luxurious office. The change in the perception of the scientist corresponds to the change of the perception of the space of the laboratory. This space is indicated through the photographs shifting between a place of research, a laboratory for personal, private use of an individual and a place of instruction, a ‘collective’ classroom. In fact, these transformations of the role, identity and social status as depicted in the photographs, pose under discussion the mystification (of the closed, small, isolated group) and demystification (speaking of regimentation, diffusion, democratization) of science.



Figure V: Dr. Orfanides, University of Athens, 1930

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<sup>17</sup> Latour, B. (1987), *Science in Action: How to follow scientists and engineers through society* (Cambridge, MA: Harvard University Press).

#### **(4) On gender and science**

At this stage, we have not yet developed an adequate language for describing the different kinds of masculinities displayed in the context of the methodology or production of science, and nor can we say categorically what it is about the properties of equipment and space which makes it either feminine or masculine. Perhaps, the under-representation of women and the characterization of the culture of natural sciences as male amongst other issues have started to take shape, or rather image; however, more thorough research is needed to come to solid conclusions. We chose to use photography in an attempt to develop a new language for talking about gender-science relations, “a language which does not rely upon simply reproducing the old, oppressive dualisms, but equally, does not efface real differences of power, access and control in relation to technology along gender, class, ‘racial’ and other lines”.<sup>18</sup> This photographic research hopes to be the basis for further study towards a substantial epistemological relation between gender and science.

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<sup>18</sup> Grint K. & Gill, R. (eds.) (1995), *The gender –Technology Relation: Contemporary Theory and Research* (Taylor-Francis: London).