

Brain Differences Between Men and Women in 8th – 4th Century BC Ancient Greek Authors and Greek Scientific Journals that were Released in the Late 19th Century: A Comparative Study

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Abstract

In this study we examine the differences that exist between the male and the female brain, on the level of cognition, structure and function, looking through Homer's, Plato's and Aristotle's work, mainly. We, also, review various scientific articles published in Greek magazines over the last three decades of the 19th century. The views of the three Greek philosophers mentioned above are then compared to the views expressed on the issue over the last three decades of the 19th century, as well as to the latest findings of neuroscience.

We have found that, in Greece, over large periods of time, women's cognitive abilities were generally questioned, when compared to those of men. In our study we focus on two different female figures: Penelope, who is repeatedly characterized by Homer (51 times in total) as "perifron" (= very clever) and Kallirhoe Parren, who wrote a lot of articles about the structure and functions of the male and female brain. Finally, there are, indeed, differences between the abilities of the male and female brain. What we should truly focus on is the ways in which the cognitive ability of each sex complements each other and far less on comparing and contrasting their differences. The knowledge of whether there are differences in the structure and abilities of the brain of men and women is of great importance, since our brain is what makes us who we are, our thought process, energy, decision-making and emotional state depends on it. Our knowledge with regard to the structure and function of both the male and female brain aid us in counseling, especially when it comes to couple relations, but, also, in the therapy of cognitive function disorders.

Keywords: Brain; Brain Development; Neuroscience; Differences Between the Sexes; Cognitive Function; Type; 19th Century; Newspapers; Magazines

Introduction

This study presents the differences in structure, functions and cognitive processes between male and female brain, starting with Homer, Plato, and Aristotle and moving on to scientific articles published in the last three decades of the 19th century, including articles that appeared mainly in Greek publications from 1870 to 1900. Only one of the magazines studied - titled Neologos¹ = new word - was published in Greek, in Constantinople, and targeted the city's Greek population and generally its inhabitants, who were many thousands at the time. It is of great importance to comprehend whether men's and women's brains differ in structure and abilities, since our brain makes us who we are and according to Anem Clinic² (according to Kokkini [1]), it controls our every thought, action, decision, and mood. The brain is the most flexible of our organs, which undergoes transformations, depending on the way we use it ([2], p. 16).

Understanding the differences in the brain of the two sexes is very important, given that brain disorders, also, seem to affect men and women differently ([3], p. 108-109). According to Anem Clinics (according to Kokkini [1]), it is possible to explain, in part, the reason why women have an advantage over men in areas such as empathy, cooperation, self-control etc. On the other hand, women have higher rates of Alzheimer's disease and they are, also, more vulnerable to anxiety, depression, insomnia and nutrition disorders, while men have higher rates of Attention Deficit Hyperactivity Disorder (ADHD).

¹Other women's magazines that were published in Constantinople at the same time were Eurydice and Bosporis.

²Amen Clinics are a group of mental and physical health clinics that work on the treatment of mood and behavior disorders

However, the brain, this masterpiece of creation, is almost unknown to us, as Nicolaus Steno stated in 1669 and is still true today. One of the many related questions that arise is whether the male brain differs from that of a female, in terms of its structure and functions. Richard Haier (professor at the University of California) has proven that the two genders use their brain differently. In later surveys was, also, shown that gender differences in a series of cognitive abilities are related to the way each gender uses the brain.

The different ways in which men and women use their brain appears to be related to the brain's structure [4]. In a study using MRI (which records neuron structure) rather than fMRI or PET (which record neuron activity), many details about gray and white matter were revealed. Gray matter is mainly found in the occlusions of the cerebral cortex and contains neuronal cell bodies (neurons), while white matter is located under the cortex and it consists of the axons of the nerve cells. Richard Haier, *et al.* (University of California) examined the brain structure of 48 men and women with the help of MRI, using known intelligence indicators, in order to investigate whether there is a link between the thickness of gray and white matter in some regions of the brain and intelligence. The results showed that: I. The intelligent men participating in the experiment had highly developed gray matter in the rear of the parietal lobe. This is the area where sensory stimuli are processed, and II. The intelligent women had highly developed gray and white matter in the frontal lobe. This is the area where language functions are located.

Dr. Joel mentions in her research that she and her partners examined over one thousand brains, analyzing data on both structure and functioning. Brain differences present what is called a “mosaic” pattern and each of us is a combination of different “male” and “female” characteristics. In fact, Joel found that almost half of the brain samples had a very “male” version of a feature along with a very “feminine” version of another feature. Moreover, Joel and her colleagues, using a sample of 5,000 people, studied 25 behaviors differing, on average, between men and women, such as video games, scrapbooking and an interest in cosmetics and watching sports frequently. Again, scientists identified a similar pattern of behaviors: the participants did not belong to only one of the two distinct types. In addition, they reviewed a series of studies showing that average gender differences can quickly change or be reversed by changes in the environment. Female rats, for example, typically have less dense receptors in the dorsal hippocampus, which is crucial for memory, compared to male rats. However, when test rats underwent a few weeks of mild stress, the pattern was reversed: Males had then less dense receptors than females. The reasons behind this are not entirely clear [5].

Everything about our brain pertains to both biology and culture; it is the result of complex, varied, multidimensional, interactive interactions between genes and the environment that we have just begun to comprehend. For scientists, the fundamental question is how exactly behavioral differences emerge, if they exist, and how we expect future behavior of each gender to be shaped. Daphna Joel of Tel Aviv University, a leading researcher who studies gender brain differences, sums up her new research as follows: When thinking about brain and behavioral differences, we tend to use the model of physical sex differences, such as breast and beards. These physical differences arise from complex interactions between genes, hormones and the environment, but in general, specific features are related: There is one type of male body and one type of female body. Breasts and uterus go together, and they rarely go with a beard.

Scientists have found that, on average, men and women differ in relation to certain brain and behavior characteristics. Joel found that almost half of the brain samples had a very “male” version of a feature along with a very “feminine” version of another.

In Minoan culture³, men and women were considered to be equal, as evidenced by the many female deities of the Minoans. This is not the case with the Semitic people, who were stock-breeders. One reason for the difference in attitude towards equality is that stock-breeders eat mainly meat and this practice is linked to violence. In other words, equality was wiped out by violence.

In his work Homer created wonderful women, goddesses and mortals. His main female character is Penelope⁴, whose name is mentioned 52 times next to the adjective “περίθρων” (perifron)⁵. *And it is possible, if not certain, that the logotypic⁶ adjective “περίθρων”⁷ refers not so much to her unbiased wisdom, but rather to her flexible mind, Maronite⁸ notes.* Meanings of the adjective “περίθρων”⁹ are: the person who surpasses others in virtue, very prudent, wise. Of the 52 times the adjective “περίθρων” is cited in Homer’s poems, 51 are

³The Minoan civilization extends from 3000 to 1450 B.C.

⁴Penelope, the wife of Odysseus, was the daughter of Icarius and the nymph Periboea. Originally she was called Ameiraki. She is renowned for her faith and the web. She is the polar opposite of Clytemnestra and Helen (Homer, *Odyssey* 1992)

⁵52 refer to Penelope (4 in Eurykleia) and 1 to Aegiale, daughter of Adrastus, in total 57 times in both poems of Homer.

⁶L ogotypic, in the sense that it consistently accompanies her name.

⁷Some translators of Homer translate the adjective “περίθρων» as prudent (.....)

⁸(Δ. N. MARONITIS, 1998)

⁹The meanings found in dictionaries for the adjective A. «περίθρων» : 1. He/she who surpasses others in virtue, LIDDEL - SCOTT, 2. Wise, prudent, sagacious (= having wisdom, intelligence and knowledge), Dimitrakos, 3. Proud, arrogant, Montanari, 4. Wise, prudent. Homer Dictionary I. Pantazidou.

B: The prefix «περί» as a first component has the following main meanings: 1. Extension to every direction around a center, surround, enclose, enclosure), 2. Circular rotation (rotate, roll, revolve), 3. Over, above, in the sense of surpass, 4. Excessively, that is to say, “περί” reinforces the simple meaning (notorious, intricate, overjoyed, elaborate, sought after). 5. The prefix «περί» in Latin also means too much (permultus = too much), (pergratus = too glorious), (perquam = exactly). LIDDEL – SCOTT.

in the *Odyssey*¹⁰ and one in the *Iliad*¹¹. Penelope, therefore, is described as “περίφρων”¹² and πολύτροπος (= distinguished by flexibility, multi-mindedness, resourcefulness). Odysseus is also described as “polytropos” in the first verse of the *Odyssey*¹³. “Similarly, to Odysseus, Penelope is, also, resourceful, since by inventing the woven fabric that was never completed, she kept on postponing marriage for a long time. On the *surface*¹⁴ of the poem, Penelope remains, for twenty long years, firmly faithful. Essentially, though, the *Odyssey* boldly studies erotic pathology, reconciling paramarital diversions and conjugal processes. It is a question of finding a refined way that favors the passage from the first (the diversions) to the second (the marital faithfulness)” [6]. During the Homeric years¹⁵, a woman is distinguished by her mental abilities, good judgment and, when necessary, sound management, all of them characteristics attributed to Penelope¹⁶.

Contrary to the position taken by Homer towards women, Plato’s position in his work “*Timaeus*”¹⁷ (41d-42c) is extremely degrading of women: The best kind of human nature, which is dual, is man. Through the course of his life, his soul, incorporated in his body, is tested by many passions. If he overcomes them, he can continue living after his physical death. However, if he is defeated by them - hence he has not lived his life ethically - his soul after death, during his second birth, will take the form of a woman ... Of the first-generation men, those who were cowards and unfair in their lives, will reasonably turn into women during the second birth (*Timaeus* 90e). In *Timaeus*, the Creation of the World and the nature of the soul is described as follows by Plato: The creator of the universe prepared the mixture of the soul of the world and of the gods in a crater, where he had put the immortal/first-quality materials that he used. In the same crater he then added second and third class materials, but there was some leftover first-class materials, with which he created the human soul. [The Creator of the universe explained] that human nature is dual and its best kind is what will later be called a “man”. The Creator, also, revealed to them that, when souls are forced to incorporate into bodies - in bodies that accept additions and suffer losses - they will initially get familiar with the -common to all souls- ability of feeling, caused by violent stimuli; then love will come, mingled with pleasure and sorrow, then fear and anger, along with everything that accompanies them and that is opposite. And if they manage to defeat these passions, they will follow the right path in life; but if they are defeated by them, they will drift away. Anyone who lives properly his or her share of time, they will return to the home of their related star and lead a happy life there. But if they fail, they will turn, during their second birth, as a woman. If they continue again on the wrong path, then, depending on the kind of misconduct, they will continually take various forms of a beast, the same in nature to the malice they have shown; and they will not break free from any consecutive incarnation and sufferings, until they allow the smooth rotation of what is unchanging and uniform to prevail in them.

Plato’s view of women was not that harsh in his earlier work “*Republic*” (Πολιτεία)¹⁸. In this work, Plato states that women deserve better and that if they are trained in the same way men are, they will take steps towards being equality with the male gender.

In *Republic*, Plato argues that women can participate in what was considered to be men’s work¹⁹. However, he adds the words “to the best of her abilities” (*Republic* E, 466) and phrases such as “for the genus (= female gender) disease” (*Republic*, E 447) and “a woman is, in all respects, weaker than a man” (*Republic*, E 455). However, when he refers to female weakness, it is more likely that he refers to physical

¹⁰In *Odyssey* (α 329, δ 787, δ 808, δ 830, ε 216, λ 345, λ 446, ξ 373, ο 41, ο 314, etc.)

¹¹In *Iliad* (E 412)

¹²Stamatakos Dictionary: «περίφρων» = very prudent, very cautious. “Περίνοια” (Perinoia) = prudence, intelligence / excessive wisdom. Perinoos = extremely wise

¹³ἄνδρα μοι ἔνεπε, μοῦσα, πολύτροπον [*Odyssey*]

¹⁴Under the surface, though, in the *Odyssey*, Penelope is somewhat erotically ambiguous: she tolerates the presence of the suitors in the palace, which also causes Telemachus’ reproach, even in the depths of despair for Odysseus’s definitive -as she believes- loss, she does not rule out the possibility of a second marriage with one of her suitors. She postpones marriage for as long as she can, but in the end, with the consent of her still indistinguishable lawful husband, she provokes it, by inventing the sport of archery, literally at the last minute.

¹⁵12th to 8th cent. BC.

¹⁶Popi Halkia-Stephanou, Women In Homer. Edition “Dafni” Magazine, July 2002

¹⁷*Timaeus* is one of the works Plato wrote when he was old; it was written after 360 BC (following his trip to Sicily).

¹⁸It was written around 380 BC, or was completed around 374 BC.

¹⁹The same work of Plato (*Republic* 455a) states: Isn’t it true that women are, by their own nature, different to men? Also later in 455d (p. 351): You are right to say that, in one word, the (female) gender is, in all respects, much inferior to the other (male) gender. Of course there are many women superior to men in many aspects. However, as a whole, what you say (what you said before) is right... natural dispositions are equally divided in both sexes and women and men alike are designed to take part in all kinds of works, nonetheless a woman is, in all respects, a weaker creature than a man.

rather than spiritual strength. In the Republic, Plato, also, supports the view that women and children should be common property, that is to say women and children should belong to all/to the state. This radical view was the result of Herodotus's influence, who had visited other nations, where women were common property. Herodotus had visited: the Massageteans (the equivalent of today's Tatars), the Agathyrsi (cosmographers place them in today's Transylvania) and the Nassamones (on the coast of Libya). Among Nassamones, "on the first night of the wedding, all guests "sleep" with the bride" (Diomatari, 1975).

Aristotle, who otherwise possessed a compelling mind and went against the rules of many traditions, was, too, unable to overcome his bias in favor of men. Aristotle argued that men are, by nature, superior and able to rule²⁰, because "the male gender (is) stronger than the female one" (Aristotle "The Economics" 1,3).

In Aristotle's work we read "Some ancient Greek philosophers say that animals that have no blood are warmer than those with blood and the same applies to females, when compared to males. Parmenides, for example, says that women are warmer than men, and there are others that agree with him, arguing that menstruation occurs, because of women's warmth and their abundance of blood. Empedocles, however, advocates the opposite"²¹.

Similar degrading views on women's abilities compared to those of men and on women's position in society can, also, be found in other writers, such as Plutarch²², who, in his work "Advice to the bride and groom" (138a-146a), supports women's complete dependence on men.

A woman, Aristotle argues in his work *Politics*, has mental and moral virtues, just like a man, but to a lesser extent, that is to say to the extent that she complements and serves her husband. More specifically, she must have as much wisdom as needed. Again, she must have as much courage and a sense of justice as needed to carry out her work. For this reason, as Socrates argues, her virtues are not "female" as opposed to "male", but "servile" as opposed to "leading"²³.

Several of the issues relating to the brain of men and women, as well as the abilities of each of the two sexes were answered by columnists in Greek publications in the last three decades of the 19th century.

What is recorded in journals of the last three decades of the nineteenth century about the differences between a man's and a woman's brain?

"XIX century is the age of women. Perhaps this title is fitting in order to describe it as a century of freedom and truth, as well as equality, a century of justice and love... At no other time has woman more faithfully embodied the symbol... of the mother of Christ²⁴". Towards the end of the 19th century, renowned Greeks expressed themselves in the most positive way for the woman's place in the family and society²⁵. This is of great importance compared to the truly negative way a few decades ago a newspaper commented on women's fight for their right to vote²⁶. During those years many women's magazines were released. Some of them were actually an initiative of women publishers, having mostly women writers²⁷. Most of the articles in the late 19th century were aimed at supporting gender equality and were published

²⁰(Aristotle, Politics A2 or Politics 1.3).

²¹ARISTOTELES et CORPUS ARISTOTELICUM Phil. De partibus animalium {0086.030} Bekker page 648a

²²PLUTARCH Biogr. et Phil. Conjugalium praecepta = Advice to the bride and groom (138a-146a) {0007.078} Stephanus page 139 section C line 6

²³Aristotle Politics 1259b 28 1260a2

²⁴Ladies' Newspaper, Athens 1st January 1900, No 601

²⁵"The nature of woman is consisted of only two elements, love and sentiment, and her whole life is devotion" N. Saripolos, 1865

"Educators of the nations are their rulers, their writers, the priests, the teachers, the parents and especially the mothers. Among them, nature has undoubtedly offered the first place to mothers." L. Melas, 1871.

"Man, fearless and daring in danger, able to resist, overcomes revolts and opposition, and overwhelms due to his muscularity and his power of mind. Woman, on the other hand, rules due to her grace and meekness." G. Manoussos, 1884

"Woman, more sensitive, subordinate, endearing, should obey and turn her devotion to rule, her sacrifice to triumph, her self-denial to magnificence." S. Vlavianos, 1894

²⁶"Myself and all of the men would rather they ... suffer instead of suffrage so that we get better. That's outrageous!" Vradini newspaper, 31/01/1929

²⁷Edited by women Ladies' Newspaper

in the famous *Ladies' Newspaper*²⁸ and other women's pages in newspapers²⁹. Those writing spaces were understood to be gender-sensitive, which, at the same time, rewrote and restructured gender. The flourishing of women's publications gave an opportunity to women to become "visible" as writers or readers or even as the main object of interest in these texts.

Parren relies on the views of 19th century researchers to substantiate that there are no differences in the cognitive functions of the male and female brain. One of the testimonies she quotes is that of the "wise German Buchner", according to whom "a smaller but healthier brain that functions is preferable to a larger and coarse one ... The so-called man's superiority due to the size of his brain is a mistaken and ridiculous idea"³⁰. The views of other female columnists in publications of the era we are examining are similar to the one above. To the contrary, certain male columnists support that there are differences in the brain and emotional state between the two sexes. These differences are attributed to the fact that God created the two sexes to be different, because their destination was different "from the start". If men and women were given the same assets, one of the two sexes would be redundant and their co-existence impossible, argues A. Spathakis in one of his articles for the magazine *Family* on January 18, 1897³¹.

Columnists views on brain differences between the genders in the period under examination³²

I³³: Ignatius Moschakis, in an extensive article dating back to 1887, titled *Brain and Soul* ("Week" magazine), also examines the subject of differences in the brain between the two sexes and contradicts the belief "of the materialists that the female gender is mentally inferior to the male". Moschakis arguments focus on the following: 1. World History names many prestigious women in various scientific and social settings in different countries (he lists names of such women). 2. Each of the two sexes has a different destination, 3. If a woman is relieved of her household obligations, she will excel in any area she chooses to involve herself in. He suggests, also, that a woman should continue to involve herself with her esteemed role as a hostess. Last but not least, he disagrees with the materialist's view that ideas and values, virtues and noble sentiments spring from a "materialistic device", the brain.

II³⁴: Kallirhoe Parren writes an article titled "The female brain bigger and heavier to that of a man's" in an 1888 issue of *Ladies' Newspaper*, in which she claims that women were created with a brain resembling in every way that of a man. However, later on, her living conditions contributed to the weakening of her spiritual powers. Then, Parren refers to the fact that Paul Broca examined prehistoric skulls and notes: "Of the twenty-one prehistoric skulls found by the anthropologist P. Broca in Lozer's cave, only seven male and six female were identified. The skulls gave an average "size³⁵" of 73, 13 for women, while for men 71, 45. Vervie has ruled that there is no relation between the enlarged cerebellum and mental superiority". From the findings of Broca Parren concludes that in ancient times the brain of the two sexes was very similar, but later on the female brain lost its mass and weight, due to enslavement, ignorance and its mechanical function.

III³⁶: In the main article of the *Ladies' Newspaper*, February 5, 1889, the editor announces the weekly publication³⁷ of a series of articles with the title *Woman's History from the beginning of time to the present day*, starting from March 1, 1889. After pointing out the difficulty of the task, (such as collecting the data, for example) she states that she will work hard for the sake of women who have constantly been underestimated by men all the previous years, even though there are "poets, artists, happy lovers and many fathers of good daughters, who glorify woman and consider her to be: kind as an angel, a saint and a true benefactor to humanity".

²⁸The newspaper mentioned was the oldest publication at the time (1886-1917)

²⁹We have recorded women's magazines/newspapers we came across during our research and which were published mainly in Greece during the last decades of 19th century have been recorded. SEE ANNEX

³⁰As above.

³¹"If both genders were given the same virtues and the same qualities, then the other gender would be redundant and the cohabitation of both genders would be impossible. Suppose for a moment that man had the virtues of a woman and a woman had the virtues of a man. In that case, do you not feel that the creation of the other gender would be absolutely superfluous? Would God not be, rightly so, accused as creator of unneeded beings?

http://digital.lib.auth.gr/record/143815/files/5453_3.pdf

³²We study the articles following the chronological order in which they were published in newspapers and magazines.

³³Moschakis, I. "Brain and soul". Published in the magazine "Weekly", a social and philological Review, on 7th March 1887

http://digital.lib.auth.gr/record/140342/files/5086_6.pdf

³⁴Kallirhoe Parren. Woman's brain: heavier and bigger than man's *The Ladies' Newspaper*, Weekly. Athens: 15th May 1888. Year B'. No 62

³⁵The volume of brain in proportion with the volume of the entire body.

³⁶Parren, Kallirhoe, "Woman's History from the beginning of time to the present day" *The Ladies' Newspaper*, 5th February 1889, No 100.

<http://digital.lib.auth.gr/record/30438/files/arc-2005-7831.pdf>

³⁷The article is not signed but Parren does not sign main articles

IV³⁸: Dr Chriside's article, dated March 10, 1892, mentions the various roles both genders have to play in family and society. He points out that they differ physically and mentally. Social life needs the skills each sex possesses. No one gender can be substituted by the other, just as the liver cannot replace the lungs in the body. The family is an organic and essential part of society and the two most important members of a family are the man and the woman. The fact that a woman finds protection in the family means that she is obligated to cater for the home and its domestic economy.

V³⁹: Maria Pierre, physician, published an article in the *Ladies' Newspaper*, in October of 1892, titled "*The female brain*" in which brain differences in weight or symmetry were considered unimportant. She refers to Luiz and his work "*The brain and its functions*", borrowing one of his argument that states that he never found a single brain whose hemispheres were identical. The *Scientific Inspection*, argues Pierre, using some short of "cap", recreated the brains of famous Frenchmen, proving, thus, that each of them was different. She rejected the argument that women's narrower diameter of the carotid, which carries blood to the brain, make women less intelligent than men. She considers Broca's ideas to be ridiculous, when he claims that he could tell which skulls belonged to women and which to men. She places emphasis on the brain being a world unknown to all and she argues that the long-term exclusion of women from academic and social life was the reason behind women's underdeveloped mental functions. Her article ends with a quote from a parable: if, as it is believed, Eva stole Paradise's apple (thus, knowledge), her female descendants ask Adam's descendants to give them back their half (which men kept for themselves).

VI⁴⁰: Another article that appeared in *Neologos* magazine (1892, pg. 750), which was published at the same year as Parren's, was titled "*The female brain*" and it was written by an unknown author. The article has as its starting point Christon Brown's observation that "a woman's brain weighs 30 grammars less than that of a man". Brown, also, mentions that in women "the frontal lobes are surrounded by blood in a less effective manner than those of men". As for the internal carotids, they are wider in men so more blood circulates. The spine carotids, though, are wider in women and the cranial base is, also, wider in women (28 millimeters) than in men (20 millimeters). However, the cerebellum and the occipital lobes are more developed in women. So, we come to the conclusion that -in terms of structure - the brain of both sexes differs.

VII⁴¹: In 1893, Olga Lazaridou published an article in *Neologos*, which was full of strong arguments, aiming to prove that the female brain possesses characteristics that make it more capable than the male one. She refers to G. Bruhl, a Vienna professor, who wrote a thesis titled "*Concerning the brain, the intellect and the rights of women*", where he argues that the female brain is superior to that of man, in terms of the delicacy with which it is constructed. The means by which we can study the brain are ineffective. A woman's brain size is proportional to her body. Generally, the proportion of the human brain to the body is 1/35 to 1/37. Through this analogy, a woman's brain is slightly heavier to that of a man. Still, the female brain is lacking compared to that of a man, when it comes to the anterior compartment, but it is superior to that of a man at the top or the rim dividend. If you observe the female skull from above it is shaped like two cones. Its edges are sharp. The male skull, when seen, also, from above, has an oval shape, with a bulge in the middle and back. The forehead and temples are smaller in women. Ancient Greeks used to craft male statues, like that of Zeus, with wide foreheads to recreate a sense of power...the female brain, however, is smaller and more artistic. Huskie⁴² measured the brain mass of Germans and found that in men the cranium crown area had an average surface of 262 cms and in women only 208 cms. The average size of the brain, which has nothing to do with "mental abilities", is larger in women. Closing the article, the writer states that it was translated from English.

IX⁴³: In an article titled "*Inventions and creations of women*" that was published in *Ladies Newspaper* in 1894, Helen Georgiadou supported that many women have made various inventions, all different and all precious for mankind, even though their opponents accuse

³⁸Christidis, An. Physician, The call and destination of woman in society 10th May 1892. *Neologos*. Weekly Review. The text was presented when Christidis took over as president of the doctors' Association on its 32nd year.

<http://pleias.lis.upatras.gr/index.php/neologou/article/view/27849/27832>

³⁹Pierre, Maria. "Woman's brain". *Ladies' Newspaper* Year 6th. Athens 4th October 1892. No 275

⁴⁰Unknown Editor. Physiologically. "A woman's brain". *Neologos*. Issue 47. Year 1892. p. 750

⁴¹Lazaridou, Olga .Woman's Brain. *Neologos* Weekly Review. Issue 48 26th September 1893

<http://pleias.lis.upatras.gr/index.php/neologou/article/view/28362/28345>.

An extract: "A woman's skull observed from above has a shape resembling the shape of two cones bearing obtuse tips and straight bases while a man's skull observed likewise has an oval shape, protruding in the middle and at the back...A woman's brain is smaller and more artistic, falls short in the front compartment but outbalances at the top. Huschke discovered that in men this compartment had a surface of 262 cubic cm while in women 208 cubic cm".

⁴²Probably Emil Huschke (1797 – 1858), German anatomist and embryologist.

⁴³Georgiadou, H., Inventions and confections of women. *The Ladies' Newspaper*, 1894, No 346

them of inventing nothing. From her examples, we choose to select a few: the needle, the guitar, the violin, the anchor, card games, the compass, rum, the lamp, wine, olive oil, chocolate, the inspiration to print the first newspaper, perfecting of the art of sailing, all of the above are inventions and creations of the female mind. And the writer concludes: "Finding the hours a sailing journey takes is owed to Mrs. LcFracais Lalande, who, in 1790, had drawn up a catalogue of 10,000 stars she had classified with mathematical precision".

IX⁴⁴: In 1897, Petropoulos published an article in *Family* magazine. The article was divided into five parts and was titled "Women's place in the ancient times". In part one, he focuses on the theological aspect of the issue; at first, Adam and Eve were angels, they committed the sin of disobedience, fell and obtained a mortal life full of problems. In part two, he points out that, during the time that society was uncivilized and interested only in hunting and warfare, women were viewed as inferior. In such a society, women's noble feelings were redundant, as far as personal relationships were concerned. He views the fact that Christianity established monogamy as very important, since it positioned man as the head of the family. In part three, he admits that the mental functions and strength of women are inferior to men. A woman's mind is made for light literature or metaphysical research and her brain and habits make her incapable of receiving education. Only the male brain is created for challenges. Women are patient and forgiving, while men enforce justice, he states. He expresses similar views in the rest of his article and in the parts that followed.

X⁴⁵: In 1897, Spathakis claims that a man's forehead is wider and with more lumps than that of a woman's. This proves that men's brain is of larger quantity and, therefore, they possess greater spiritual power. To the contrary, female senses are more delicate and acute to those of men. This proves that women are more sensual than men. Quoting the famous physiologist Moletotius: "*the greater development of men's brain is counterbalanced by the greater acuteness of the female senses. In a man the venomous or melancholic nature is dominant. He excels being serious, while the woman endures with a smile. The All-Mighty Creator intended for one sex to need the other; for woman to lessen the man's sadness and for man to extenuate female inertia and passivity with his actions and energy, there he should stay: one outside the house, the other inside it*".

Does the mind have a gender?

In the late 17th century Europe, Poullain⁴⁶ argued that "the mind has no sex" and based his argument in the new (at the time) science of anatomy. Women possess sensory organs similar to those of men and a brain as logical and imaginative as men; therefore, he asked, why shouldn't they be equal to men and not serve as professors, judges, army officials or ambassadors? His words were welcomed by many all across Europe. In 1674, a female chemist invoked Poullain's words, while trying to defend one of her publications. In 1884, French intellectuals, also, repeated them, arguing in favor of accepting women in the French Academy.

However, this popular phrase was, also, questioned by some. Shortly before the French Revolution, anatomists and physicians were still insisting that the mind does, indeed, have a gender, which is actually expanding "through various shades, more or less perceptible in every part of the body" - including the brain [7].

Today, the widely accepted view is that both sexes have similar brain structure, whereas every person's brain is a "mosaic" made out of both male and female anatomical features.

A more recent survey addressing this question was published in the medical journal *Proceedings of the National Academy of Sciences* (PNAS). The survey was based on special MRIs of 1,000 men and women. Researchers observed that in the male brain the connections between the anterior and posterior parts of each hemisphere are very dense, yet the ones that bridge the two hemispheres are fewer. In

⁴⁴Petropoulos, M., Woman's position in the ancient times. *Family mag*, Year 1st, issue 33, Athens, 11th October 1897

http://digital.lib.auth.gr/record/143845/files/5453_32.pdf http://digital.lib.auth.gr/record/143845/files/5453_33.pdf http://digital.lib.auth.gr/record/143846/files/5453_34.pdf

και http://digital.lib.auth.gr/record/143848/files/5453_36.pdf

⁴⁵Spathakis, A. *Family magazine*, 1897, No 5.

http://digital.lib.auth.gr/record/143817/files/5453_5.pdf

A man's forehead is bigger and more irregular than a woman's. This shows that a man overpowers woman in the power of spirit; a woman's senses, though, are more subtle and more acute than those of a man's. This shows that a woman is more sensual than a man. That's why Moletotius, the famous physiologist, is correct when he says "the major development of a man's brain is counterbalanced by the acuteness of the female senses". Men are usually choleric (angry) or melancholic and women aematic (optimistic) or phlegmatic. This shows that men are destined to do great things solemnly and women to succumb happily. And by observing this opposition we notice that the wise Creator pursued the adaptation of both sexes so as the one needs the other. Thus, man needs woman so that she moderates his melancholy (which becomes worse due to life's hardships) with her happy nature; a woman needs a man to moderate her idle, passive situation with his active nature.

⁴⁶Poullain Francois de la Barre is a French writer, philosopher and Cartesian feminist. He was born in 1647 in Paris and died in Geneva in 1725.

women, however, the communication network between the two hemispheres is spectacularly thick, which shows that women often use both hemispheres simultaneously. These differences, according to researchers, can explain why women can perform various tasks simultaneously (multitasking), while men do their best on individual projects, especially those relating to the perception of space and sensory stimuli (e.g. driving a car, piloting, cooking).

Men do not get easily distracted; they focus on a project and excel at it. This allows them to perceive and obtain a specialized and in-depth knowledge about specific aspects of the world around them, which is quite necessary, since society has become more complex after taming nature (plants and animals, i.e.) and building cities, which constantly become bigger and bigger.

When the embryo reaches the stage in which sex is determined, the male embryo receives large doses of testosterone, while the female receives estrogens. The male brain, thus, is larger but with fewer dendrites and synapses and connections between its two hemispheres. The female brain is smaller, but with more synapses than the male one [8].

The differences in intelligence can be attributed neither to biology nor to society, according to Demeter Katie, a professor of the University of Thessaloniki ([9], p. 169).

When it comes to memory skills, there appear to be differences between the sexes. All in all, women can recall stored information concerning details much better than men. Differences between the two sexes have, also, been identified in certain categories of cognitive abilities; women excel in some and men in other. When it comes to lab animals, it has been discovered that, if the hormonal environment of the fetus is affected (by administering genital hormones of the opposite sex) during the gender-related brain differentiation period, this might result in later opposite sex behaviors. The outcome could not only disturb the animal's sexual behavior, but, also, any behavior relative to learning, especially space-related memory ([10], p. 42).

The phrase "*the mind has no gender*" belongs to Mary Wollstonecraft (1972), the grandmother of feminism. This now can be understood in a different light, given that there seems to be significant differences in the way that the male and female brain function (Kimura 2002). Nowadays, such operations seem to be more complementary between the sexes, rather than the subject of comparison.

Is every embryo's brain initially female?

"It is remarkable that neuroendocrinologists believe that the brain is "female", converting to "male", because of the effect that testosterone has on it during the critical time of its development. Of course, new findings show that other factors, such as certain genes, determine the "gender" of the brain". Still the effect of the testosterone does not stop there. It has been proven that boys produce 20 to 25 times more testosterone during puberty than before.

In 2001, Jill Goldstein -a Harvard Medical School researcher- and his associates measured the brain of 45 healthy men and women. It was then that they came to the conclusion that the brain operated according to its sex. In particular, they found that parts of the frontal lobe - a part of the brain that "houses" functions concerned with problem-solving and decision-making - are larger in the female brain. There were similar findings with regard to the limbic cortex, which, among other things, controls feelings.

- Men focus on certain issues and exclude irrelevant information. Women usually see the "big picture".
- Men can concentrate on a job for a longer period of time without getting tired or feeling bored. However, women are equipped with multi-tasking abilities.
- Men and women are just as smart, but each gender is smart in its own way⁴⁷.

Through recent findings, the brain emerges as a dynamic, flexible and self-trained system of information analysis and behavioral control, aiming at eternally adjusting the individual to internal and external environmental changes. Scientists are closer to many goals, such as understanding the mechanisms of feeling and movement, of brain development, substance abuse and learning. Still, other goals, such as understanding how we reach a decision or how our imagination is set free, prove to be far more elusive, even after analyzing the complicated components that constitute their makeup⁴⁸.

Women might have a smaller brain, but their brain is nicer, more delicate and perfectly round and is better structured, compared that of men. In addition, the female brain is superior in the power of emotions.

⁴⁷(Science Illustrated, September, 2010)

⁴⁸Kostopoulos, Physiology Professor, University of Patras. Brain: Our closest stranger, p.20-21
<https://helios-eie.ekt.gr/EIE/bitstream/10442/431/1/M01.026.04.pdf>

The question of differences between the two sexes has been a long⁴⁹ concern for scholars of human behavior and it seems that the differences in male and female behavior depend on certain circumstances, which, nevertheless, contribute to the creation of stereotypes. Behavior is mainly connected to brain data processing, which, regardless of gender, seems to be a complex mosaic of “female” and “male” structures. [11].

In addition, as Rippon argues, education, experiences and many other factors change the brain structure of both sexes and therefore, differences in the way of thinking and in abilities, also, change and are never stable. Rippon says in particular: “*Different short and long-term experiences will change the brain’s structure. It has, also, been shown that social attitudes and expectations, such as stereotypes, can change how your brain processes information. Supposedly brain-based differences in behavioral characteristics and cognitive skills change across time, place and culture, due to the different external factors experienced, such as access to education, financial independence, even diet. The importance of this to the male/female brain debate is that, when comparing brains, it’s necessary to know more than just the sex of their owners. What kind of brain-altering experiences have their owners been through? Even a path as mundane as school, university and a nine-to-five career, will meld the brain in different ways to those with different experiences*” [12-36].

Conclusion

From the study of texts of different historical periods, spanning from Homer to the late 19th century, we discovered that, in Greece, there have been long periods of time in which women’s mental capabilities were generally questioned, when compared to those of men. This challenge has not been straightforward. It was not an old perception which was abandoned at some point. The dispute over the equality or the differences between male and female mental abilities was the result of: 1. the prevailing ideas on the matter over given periods of time; 2. the influences of each writer, as well as the author’s general intellectual state. Today, due to the great opportunities afforded to us by technology to conduct research on the brain, we see that there are differences in the capabilities of the brain of both sexes. Therefore, we should pay more attention in the ways that the sexes complement each other and far less in the differences between the male and female brain. More attention is to be paid to their complementarity between the sexes, the fact that they are intertwined, whereas less attention is paid to brain comparison.

Annex

Women’s magazines/newspapers which were published mainly in Greece during the last decades of 19th century

These are:

1. Αστήρ του Πόντου (*Star of Pontos*): periodical publication, published from 1885 until 1886.
2. Βοσπορίς (*Woman of Bosphorous*) It was published in Constantinople from 7th April 1899 until 20th march 1906. The editor, manager and owner was the intellectual, poet and journalist Cornelia L. Preveziotou. When it was first published this newspaper supported the principles of women’s movement; then *Woman of Bosphorous*, by use of conservative, anti-emanicipation discourse, promoted the model of a moral, patient, educated, non- working -unless for livelihood reasons- woman, of a diligent, hostess, consistent, tied-up to family happiness in the frame of Greek-orthodox morality. <https://ejournals.e-publishing.ekt.gr/index.php/mnimon/article/viewFile/8336/8474.pdf>
3. Εβδομάς (*Week*) was a Greek literary magazine. It was published from March 1884 until July 1892.
4. Ελληνική Επιθεώρησις (*Greek Review*) It was published in Athens since 1906.
5. Women’s magazine *Eurydice* (**Ευρυδίκη**), 1870-1873. It was an attempt to express and form the feminine mass consciousness in the mid-19th century. By promoting women’s development it focused on the importance, systematization and expansion of women’s education at all levels and social strata.
6. Εφημερίς των Κυριών, (*Ladies’ Newspaper*). Weekly newspaper edited by ladies. Manager, Kallirhoe Parren. It was first published on the 6th of March 1886 and was kept in circulation until 1917.
7. Νεολόγος (*New Discourse*) A daily political newspaper in Constantinople.
8. Η Νίκη (*Victory*) came out in New York from 1914 until around 1912.
9. Πλειάς “Εργάνη Αθηνά”. It was published in Athens, twice a month, since 1899.
10. Η Φιλόστοργος Μήτηρ, (*Affectionate Mother*). Periodical and pleasant illustrated journal published twice a month.

⁴⁹We have followed in this article views of Homer, Plato and Aristotle. Representative of Michael Glykas in the years of Byzantium (who lived in the 12th century in Constantinople) is representative of the fact that women have half the intelligence in relation to men (Astrol., Hist., Annales, p. 219).

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