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Araştırma Makalesi

BRAIN RESEARCH FROM PAST TO PRESENT ON THE SKILLS OF WOMEN IN MANAGEMENT: ARE WOMEN IN DESERVED STATUS IN MANAGEMENT?

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Abstract[1]

This study aims at to search prominent brain studies that externalised women from communal system and set forth the situations that more women should take the management chair. Firstly, historical definitions that discriminate women and haul them down in brain research, biological dissimilarities in brains according to gender in today's brain research, and the cultural effect shaped by the female brain in co-evolution are analyzed. Brain research in past and today, processes that provide evolution and development, are the basic data investigated. A qualitative study grounds on indirect observation was conducted by probing the data from literature, the continuums and incidents observed in history, and how the continuum was shaped. Events and facts were interpreted and described in their entirety. Brain studies that discriminate against women, the biological and communal act played by women in evolution, development and fitting women at the hub of community and management are the issues that provide clues in the analysis. It is seen how women have been subject to to discrimination with regard to competency in management as a result. As a result it appears that women are the precursor of society and management due to their evolution roles and brain capacity.

Keywords: *Brain research, Woman, Evolution, Management, Gender.*

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KADINLARIN YÖNETİMDEKİ BECERİLERİNE İLİŞKİN GEÇMİŞTEN GÜNÜMÜZE BEYİN ARAŞTIRMALARI: KADINLAR YÖNETİMDE HAK ETTİĞİ STATÜYE SAHİP Mİ?

Öz

Bu çalışma, tarih boyunca kadının toplumsal yapıdan dışlanmasında öne çıkan beyin araştırmalarını incelemeyi ve daha çok kadının yönetim koltuğuna oturması gereken durumlara açıklık getirmeyi amaçlamaktadır. Bu amaçla öncelikle beyin araştırmalarında kadına yönelik ayrımcılık yapan ve kadınları aşağılayan tarihsel tanımlar, günümüz beyin araştırmalarındaki gelişmeler bağlamında kadın ve erkek beynindeki biyolojik farklılıklar ve kadın beyninin ortaklaşa şekillendirdiği kültürel etki-evrim analiz edilmiştir. Geçmişteki ve günümüzdeki beyin araştırmaları, evrimi ve gelişimi sağlayan süreçler, temel veri niteliğindedir. Alan yazından elde edilen veriler, geçmişte gözlemlenen süreçler ve olaylar ile sürecin nasıl şekillendirildiği araştırılarak dolaylı gözleme dayalı nitel çalışma yapılmıştır. Olaylar ve olgular bir bütün olarak yorumlanmış ve betimlenmiştir. Kadına karşı ayrımcılık yapan beyin çalışmaları, kadının evrimde ve gelişmede oynadığı biyolojik ve toplumsal rol ve kadının toplumun ve yönetimin merkezine yerleştirilmesi temel konulardır. Araştırma sonucunda kadınların yönetimde yeterlilik açısından nasıl ayrımcılığa maruz kaldığı, kadınların evrimsel rolleri ve beyin kapasiteleri nedeniyle toplumun ve yönetimin öncüleri oldukları ortaya çıkmıştır.

Anahtar Kelimeler: *Beyin araştırması, Kadın, Evrim, Yönetim, Cinsiyet.*

INTRODUCTION

With the written history that started under male domination, women were discriminated, subjected to exclusion and humiliation that started from the evolution process and continued until the social and intellectual processes. The social structure built under masculine domination placed women in inferior situation than men and identified women sexual symbols.

Women are pushed to inferior ranks in management with the prejudices that have roots in history. The corner stone of this comprehension was the inadequate female brains. Men's and women's brains were measured, weighed, and women's brains found less developed than men (Romanes, 1887; Morton & Combe, 1839).

Theories that women's brain structures are inferior to men's brain structures emerged long before the human brain studies began. Historically, in explanations about how and why women are different from men, these explanations have been made through the brain. Brain explanations that exclude and denigrate the female brain have been repeated over and over. Thus, by repeating the same things almost like brain washing, the facts were distorted, the flow of thought in the minds was interrupted and social attention was directed to a silent and abstract point. In this way societies in the eighteenth and nineteenth centuries were convinced that women were socially, intellectually, and emotionally inferior (Rippon, 2019, p. 9).

This process of persuasion shifted societies towards women's supposedly "natural" roles as caregivers, mothers, and feminine companions of men in the 19th

and 20th centuries. The message was consistent: there were 'fundamental' differences between men's and women's brains and that these differences would determine their different capacities, characters and different places in society. Untested assumptions remained the solid and immutable bedrock of stereotypes (Rippon, 2019, p. 10).

Consequently, this became a prejudice in the motive for fitting men to management positions in education, power, politics, science, and all public affairs. Therefore there is an urgent need for explanations that nullify this injustice and guide women. Within this context the role of women should be searched and clarified in evolution (Darwin, 1981; Morbeck et al., 1997; Lancaster, 1975), social selection (Lindenfors et al., 2007) and transformation to human form (Leakey, 2008).

The research study aims to search the discrimination against women in history by brain studies, the act of women in evolution and human development and clarify the situations that more women should take the management chair. The research is intended to give convincing messages that women should be placed at the center of society and management.

It is contemplated that research may contribute to eliminating various negative prejudices against women. The research is unique with regard to remedying social problems, explaining what the female brain has accomplished, responding to efforts to discriminate against women and female brains. It is thought that describing the power of women in management might open the way for more female managers to sit in the executive chairs.

METHODOLOGY

It is crucial to mature responses to probes below in order to attain clarifying knowledge on the discrimination against women in history by brain studies:

1- What are the prominent brain studies that externalise women from the communal structure and what underlies beneath them?

2- Concerning the biological structures what are the dissimilarities among female and male brains?

3- What was the evolution, the social selection, the transition to human formation and the strength that created the mental structure?

The research is based on situation analysis, the problem was defined in the introduction part and research questions above are determined within the context of the research design.

Brain research in history and today, processes that provide evolution and development are the basic data. Qualitative study based on indirect observation was analyzed by searching data from literature, the processes and events in history were investigated. Data collection technique includes articles, books, qualitative and quantitative research results based on literature review. For the analysis of data

situations were described and situation analysis was made based on situation themes. The events and facts were interpreted and described in their entirety. The literature review was conducted taking into account concise, clear, critical, convincing and contributive features. Brain studies that discriminate against women, the biological and social role of women in evolution, development and placing women at the center of the community and management are the fundamental points.

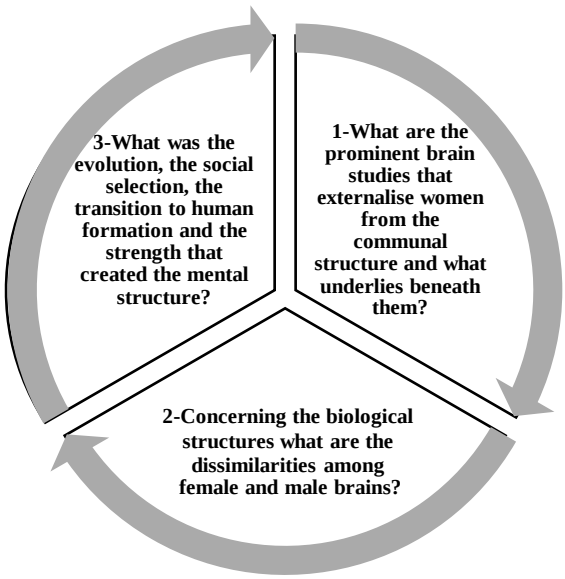
Progressive brain research studies reveal the real biological differences in gender and explain the superior aspects of the female brain. Women represent the beginning of evolution and have achieved evolutionary formation by using brain structures in a different way from men.

The research data limited to the secondary data include the various research related findings from the literature.

The research study is expected to stop discriminatory outlook and, to eliminate various negative prejudices against women and provide a prospect for women to achieve the managerial revolution through changing the management mentality. This is needed in today's conditions, where individuals, groups, organizations, sectors and nations of world are in the search better management.

Figure 1 below is the research model.

Figure 1: Research Model



It is substantial to acknowledge the historical brain research on women, in addition to the revolutionary information in today's brain research that female brain

role in social selection, sexual selection and cultural evolution reveal. Therefore, these issues are the main focus of the research.

BRAIN RESEARCH IN HISTORY

In this section, brain studies that discriminate against women throughout history, the biological structures and dissimilarities among female and male brains, social reflections of gender differences in the brain is reviewed.

Brain Studies That Discriminate Against Women Throughout History

For centuries, the female brain has suffered from being evaluated *as supposedly weaker, less developed, inferiorly evolved, inadequate, and generally flawed compared to the male brain. Women's fragility, emotional instability, and scientific incompetence, which are cited as reasons for their unsuitability for responsibility, power, or privilege, are embedded in their identities as increasing humiliation. This is a prejudice originated in eighteenth century and even now is kept alive today and placed in social memory with the aim of excluding women from society and management. This prejudice defines the brain as "male" or "female," attributing differences in behavior, abilities, achievement, personality, and even hopes and expectations among individuals to having one or another brain type. This prejudice that has misled brain science for several centuries formed the basis of many damaging stereotypes, and situated it at the forefront of social progress and equal opportunity (Rippon, 2019, p. 9).

Brain gender differences are a topic that has been argued, examined, promoted, criticized, acclaimed, and despised for over 200 years. This problem is a stereotyped view which has been kneaded with history, sociology, politics and statistics, and has been the gravity centre of studies for each science from genetics to anthropology. There are some strange claims that women's qualifications are lower than men's since their brains are 141.75 grams lighter, or women cannot read maps is a structural disorder in their brain nerves (Romanes, 1887; Morton & Combe, 1839).

Sometimes a single claim can be strongly entrenched in social memory as a fact. Despite all the efforts of science, this established claim turns into an established belief and becomes permanent. Such claims are often promoted as a deep-rooted truth, become stereotyped as a social cliche of gender differences, and put into effect to route political decisions. (Rippon, 2019, p. 9). Thus, in the 18th and 19th ages, it was broadly recognized that women were lower compared to men extrovertedly, intellectually, and emotionally. When the male brain and female brain are compared, they are stated to be different, and these gender-based differences determine their capacities, characters and place in society. These untested hypotheses have been the basic information on which these stereotypes are firmly and invariably set (Rippon, 2019, p.10).

Skull measurements

The science of phrenology claims that skull size and shape determines personality traits, character, and delinquency. This branch of science has given precise definitions and meanings to certain sections of the brain and skull. These meanings and definitions have defined criteria that rank groups of people. Phrenology, which gained popularity in the 19th age was apparently as useful and decisive in general, but its scientific content is still questioned. French medical scientist Pierre Paul Broca, by virtue of his research on the brain in 1861, made an important discovery in his professional career called Broca's Zone[2]. However, the recent involvement of brain tumors in the ability to speak has weakened the importance of Broca's area (Plaza et al., 2009).

Broca and his team believed that important mental activity was in the front of the cortex, and the posterior regions were engaged in the further ordinary tasks of reflex, sensation, and emotion. This belief has led false brain data such as superior people have more anterior functions and less posterior functions in the brain.

Although Gratiolet defended that brain dimensions have no concern with intelligence, Broca and Morton were interested in assumptions linking differences in average brain size with mental traits (Gould, 1996).

When we look back at the discussions of the 1800's in brain searches, we see the claims of intelligence differences based on skull size. According to Gould (1996, p. 94), S. G. Morton (1844) assumes that he measures an innate difference in intelligence. Morton was keen to connect dissimilarities in brain greatness straightly as dissimilarities in intelligence. Therefore, he never turned to another assumption for disparities in mean skull capacity.

Whereas, brain sizes are relevant to the grand of the bodies that bear them; people with large bodies incline to have bigger brains than people with small bodies. This reality does not mean that more sizeable humans are more intelligent, otherwise elephants with sizeable brains than humans would be expected to be more intelligent than humans. The identical is accurate for male and female body sizes, since the male body is greater than the female body, it is a natural result that the male brain is greater than the female brain.

Based on Morton's view, Broca focused on the following issues in his explanations on male and female brains (Broca, 1861, p. 89):

• Men have larger brains than women.

• This disparity in size between man and woman brain widens through time.

[2] The region of the humanoid brain where speech and sound occur. It was discovered in two sick persons who were monitored to have lost their speech abilities consequently depredetion to the bottom of left frontal lobe; this region was defined as Broca's zone.

Broca based his most comprehensive study on this subject on autopsies he performed at four Paris hospitals. Broca calculated an average weight of 1.325 grams for 292 male brains and 1.144 grams for 140 female brains, and stated that the dissimilarity of 181 grams met to 14 percent of male weight. Although Broca understood this dissimilarity should be ascribed to the circumstance that men were larger in size, he did not make any corrections in his explanations and did not investigate the issue of dimensioning the impact of body mass index on the brain and stated that there was no need for this.

In the discussion that German brains weigh, on average, 100 grams more than French brains Broca tried to save the French from the claim of German superiority and directed attention to the female brain (Gould, 1996, p. 121). However, German anatomy scientist Friedrich Tiedemann proposed to query even if the petty dimension of the female brain is purely caused by the small size of her body (Tiedemann, 1836). Broca explains his claim about the female brain as follows:

"*After all, size can't explain all the difference. Because it is known that women are not as smart as men. We may question whether the small size of the female brain is solely due to the small size of her body. Tiedemann suggested this: But it should be noted that women are generally less intelligent than men. Therefore, we must assume that the female brain is smaller than the male brain, due to the fact that the woman is physically inferior to the man and is due to her inferior position in her intellectual accumulation"* (Broca, 1861, p. 153).

To ensure that his descriptions fit in the literature, Broca measured the volumes of ancient skulls in the L'Homme Mort cave. While the difference in volume between men and women in modern societies varies between 129,5 cc. and 220,7 cc., Broca found 99,5 cc. difference. Broca's outstanding student, Topinard, describes the contradiction he sees as a result of different evolutionary pressures on dominant males and passive females and states that:

"*The man who fights in the struggle for existence, who has all the responsibilities and concerns of tomorrow, who constantly struggles with the environment and his rivals, needs more brains than the woman who needs to protect and nurture. The man's role is greater than that of the woman, whose role is to raise children, to love, and to be passive and has no other occupation"* (Topinard, 1888, p. 22).

Gustave Le Bon, one of the misogynists in the Broca movement in 1879, was the scientist who made the most violent attack on women after Aristotle in the modern scientific world. Le Bon, the founder of social psychology, is not a marginal hate-monger; He wrote La Psychologie des Joules (1895) on the behavior of the public, which is still cited and respected today, and his statements had a huge impact on Mussolini. Le Bon contributes to the humiliation of women as follows:

"Among the most intelligent races, including the Parisians, there are many females whose brains are closer to gorilla brains than to developed male brains.

This imperfection is too obvious to be objected to; only the degree is worth discussing. All psychologists, poets, and novelists who have studied women's intelligence today agree that they represent the lowest forms of human evolution, closer to children and savages than to adult and civilized men. They excel in indecision, inconsistency, lack of thought and logic, and inability to reason. Undoubtedly, there are some outstanding women who are far superior to the average man, but they are as exceptional as the birth of any beast, such as the birth of a two-headed gorilla; as a result, we can ignore them completely" (Le Bon, 1879, pp. 60-61).

Le Bon did not shy away from the public consequences of his perspectives, but was also displeased that American reformers were giving women equal terms as men in higher education:

"The desire to give women the same education as men and to propose the same goals is a dangerous and far-fetched dream. A social revolution will begin today and everything that protects the sacred bonds of the family will disappear" (Le Bon, 1879, p. 62).

Brain science research, which is used as a tool to discriminate against women from society, has moved away from these primitive thoughts over time. Brain science research, which developed in the 20th century and carries on until today, continues to reverse the myths about male and female brains (Borkenau et al., 2013; Hyde, 2014; Iliescu et al., 2016; Wierenga et al., 2018; Ritchie et al., 2018).

The Biological Structures and Dissimilarities among the Gendered Brains

The advent of new forms of neuroimaging technology, which developed at the end of 20th century, offered the opportunity to find out if there were really any dissimilarities among women's brains and men's brains. In 1982, two scientists announced that there are gender differences in corpus callosum size (DeLacoste-Utamsing & Holloway, 1982). The corpus callosum as the link of nerve fibers approximately ten centimeters prolonged, binding the right and left moiety of the brain, and at the same time the largest white substance of the brain, it is connecting and correlating more than 200 million nerve cells, to provide the information contact among the both side lobes of the brain (Zaidel, 2003). Sensory information, such as the sense of touch, is transmitted from one party of the body through thalamus to the cerebral hemisphere, the information are then shared with the other hemisphere of the brain via the corpus callosum. (For additional medical explanations, see Appendix 1).

Bennett Shaywitz and colleagues, in their groundbreaking study of language use, uncovered that specific areas of the brain's prefrontal cortex, involving area of Broca operated dissimilarly in men and women. About half of women operate both the right and left frontal lobes in their brains, while men activate only the left hemisphere in their brains. The exploration group found similar effects by repeating

their own study, but this impact was not detected in all studies (Shaywitz et al., 1995; Frost et al., 1999; Pugh et al., 1996; Pugh et al., 1997).

Besides the creativity is not only for the right brain, it includes the entire brain, as it accesses a large network of connections. As soon as the brain performs its creative activity, brain waves rise, brain cells connect to each other and place the new idea in consciousness. This activity works with a focus on the creative time span alongside the right neocortex, interpreting metaphor, perceiving jokes, understanding the language of the unconscious, poetry, art and myths; the dreams logic that make the unfeasible come true is realized here. At the moment of creativity, right hemisphere cells collect information by using liaisons with other pieces of the brain and can bring them together in a new organization (Goleman, 2011, p. 18; King & Brenner, 2023, p. 20).

The area where the similarities between the male and female body changes through growth is the "amygdala". At obstetrical delivery, it is equivalent in males and females, though reaches much major size in males by about 8 age-old. Nevertheless, at about 10 years of age, the volume begins to lessen in men but proceeds to augment in women, thereby that from around 20 years, the amygdala magnitude is more in women than in men (Goldstein et al., 1999). There is one amygdala in each hemisphere of the brain, and the right amygdala serves as the emotion centre of the midbrain (Goleman, 2011, p. 7).

The bed nucleus stria terminalis runs along the lateral edge of the thalamus and is a fiber band structure. In the case of threat, it gives a stress response in relation to anxiety and regulates fear against unpredictable threat signals (Somerville et al., 2010).

The hippocampus is closely related to memory (Darlington, 2009, p.12). In the lower part of the brain, under the limbic areas, there is a primitive neural network called the basal ganglia and serves as the memory system of the brain in the modern world. Basal ganglia provide instinctive information about being right or wrong at the decision stage (Squire, 2004). Although this area is a very primitive part of the brain, our accumulated wisdom of life is stored in this primitive circuit; It is our verbal cortex that creates our thoughts when making decisions. Although the basal ganglia have some direct connections with the oral areas, they have very rich connections with the intestinal tract. Therefore, when deciding, instinctive feeling is important. (*We cannot ignore the data, but if it does not fit with your feelings, it is necessary to think twice about the data)* (Goleman, 2011, p. 12).

The hypothalamus is accepted to perform in sexual action and reproduction; It is one of the initial zones methodically studied for dimorphism. Sexual dimorphism in the intermediate nucleus of the preoptic area was initially stated by Swaab and Fliers in 1985. In this research, it was explained that both the dimension and the full amount of neurons in certain areas of the preoptic nucleus are expressively greater in men than women. It was also stated that the bigness of the

striae terminal bed nucleus is almostly twofold bigger at men than women (Allen, Richey, Chai, & Gorski, 1991; Zhou et al., 1995). The hypothalamus can be divided into several different regions depending on the function of neurons located in different areas. Swaab & Hofman (1995), who investigated sexual dimorphism in the hypothalamus, stated that the nucleus has the equivalent measure in female and male infants, but minor in adult females than in adult males by reason of the dimensions reduced with adulthood in females. It is stated that the limbic system, which consists of the hippocampus, cingulate, amygdala, and septum, is the "emotion overhaul centre" of the brain. It performs in the grip of the autonomous nervous system and implicitly regulates at a certain hormone level in the body.

The locus coeruleus, a blue dot hidden deep in the cortex, is the cell cluster. Although only 15 millimetres in size, it is connected to most of the brain by a vast network of long-range nerve fibres. This blue dot consists of neurons that are the main source of the neurotransmitter noradrenaline, and noradrenaline contributes to the control of stress, memory, and attention by regulating neural communication (Grueschow et al., 2021).

The neocortex, which is associated with sensory perception, cognition, position perception, conscious thinking and language in the table, is considered the source of higher cognition, and is usually placed at the top of the hierarchy of brain structures due to its late emergence in the evolutionary process and its complex computational capacity (Delevich et al., 2019).

The striatum has the appearance of a nucleus consisting of a cluster of neurons in the forebrain. It coordinates cognitive orientation, including action planning, decision making, motivation, reinforcement, and reward perception (Yager et al., 2015).

The suprachiasmatic nucleus is located in the hypothalamus and is a small region of the brain. The neuronal and hormonal activities it produces regulate many different body functions in a 24-hour cycle, interact with many regions of the brain and control the rhythm cycle (Fahey, 2009).

The visual cortex of the brain is the area of the cerebral cortex that processes visual information. It is located in the occipital lobe. Sensory inputs originating from the eyes pass through the thalamus and reach the visual cortex. Both hemispheres of the brain contain the visual cortex; one receives signals from the other (Mather, 2012). There are meditation methods, each using a different mental strategy: concentration, attention, and visualization. Each meditation method produces certain effects on mental states. For example, visualization activates centres in the spatial visual cortex, while concentration activates the attention circuit in the prefrontal cortex. A new scientific field, thought neuroscience, has begun to map out how deep thought methods engage the brain, which brain centres it activates, and what specific benefits might be (Goleman, 2011, p. 28).

The differences according to gender in the brain areas where anatomical dimorphism is watched are given in Table 1. Although the table is not an exhaustive list of literature, it provides an example of the differences. The differences cover a wider range in men than in women.

Table 1: Differences by Gender in Brain Regions where Observed Anatomical Dimorphism

DIFFERENCE ZONE	FUNCTION	GENDER DIFFERENCE	SOURCE
AMYGDALA	Plays a role in the formation and storage of emotional memory and the formation of olfactory memory.	Volume M>F	Mizukami et.al., 1983
BED NUCLEUS OLFACTORY TRACT	Sense of motherhood	Volume M>F	Collado et.al.,
CORPUS CALLOSUM	Information transfer to the brain hemispheres	Unmyelinated axons F>M myelinated axons M>F	Mack et.el., 1995
HIPPOCAMPUS	Memory	Granule cell count, M>F CA3 pyramidal cells and Proximal dendrite volüme F>M; Distal dendrite volüme M>F	Roof 1993 Juraska et.al., 1989
HYPOTHALAMUS: -Anterior ventral	Adjusts the timing of biological processes such as nutrition, sexual behavior, body temperature and metabolism	Volume F>M	Simerly et.al., 1985
-Periventricular preoptic area		Cell number F>M	Leal et.al., 1998
-Arcuate nucleus		Volume M>F Density, denditric branches and shootsF>M	
-Medial preoptic area		Volume M>F	Gorski et.al., 1978
LOCUS COERULEUS	Regulates neural communication; Controls stress, memory and attention	Noradrenaline neurons Number F>M Volume F>M	Guillamon et.al., 1988
NEOCORTEKS	Sensory perception, cognition, position perception, conscious thinking, and language	Volume M>F	Reid & Juraska 1992
BED NUCLEUS STRIA TERMINALIS	Regulates stress and fear	Volume F>M	De Vries et.al., 1994
STRIATUM	Coordinates cognitive orientation	GABA neurons, Number F>M	Ovtscharoff et.al., 1992
SUPRACHIASMATIC NUCLEUS	Provides the rhythm loop	Spine synapses, M>F	Guldner 1982
VISUAL CORTEX	Processes visual information	Volume, number of neurons M>F	Reid & Juraska 1992

Source: Darlington, 2009: 52

Social Reflections of Gender Differences in the Brain

Simon Baron Cohen states that the natural empathy ability of the female brain is stronger than that of men, due to the assumptions he put forward and due to the language proficiency. According to Darwin, females developed finer language organisation as their survival counted on a more empathetic, swift, thoughtful and hinge utilization of language. Women can empathize better and use language better because of the fact that the relationship between these two skills is complex and bidirectional in terms of both development and evolution. Good language can promote good empathy because the urge to communicate provides social experience; good empathy, also can encourage good language, because social sensitivity facilitates communication (Baron-Cohen, 2009, p. 59).

There are differences in self-checking among the sexes. While female children are potty trained previously, male chidren are at higher threat for impulsiveness, carefulness deficiency and hyperactivity disorders. Boys scored lower than girls in the self-control test performed on three-year-old girls and boys, and it was deduced that this was related to the maturity of the girls' prefrontal cortex (Kochanska et al., 1996; Diamond, 1988). In the research conducted by child psychologist Jean Piaget on girls and boys, it is commented that the late maturation of boys is due to the late development of the prefrontal cortex, the brain area associated with action planning in boys (Baron-Cohen, 2009, p. 112).

Studies measuring the level of emotional intelligence are conducted with the data obtained from the person's own report and reliable data can be obtained from adults. These data reveal that students in humanities have higher scores than students in sciences, and women have higher scores than men at the social level. (Billington et al., 2007; Goldenfeld et al., 2005).

Men spin out more time to use language to show their knowledge, skills and status. These are more presumably to make demonstration or try to affect. This results in men interrupting more to speak their opinions and paying less attention to the someone else opinion. Women use language in a dissimilar way. They aim to advance and sustain mutual relations. Women spin out more time in using language to debate, mature relationships and engage people's ear, they do not waste time on impersonal dialogue, but they quickly progress the conversation to a tip where they may participate in personal sentiments and intimacy. While women's speeches generally express positive feelings for their friendship by approving the other person, men cannot express their feelings openly (Smith, 1985; Hartup et al., 1993).

There are some research results that debunks myths about male and female brains. Gender differences in neocortex structure and cognitive performance in terms of coursing velocity, focus attention, operant memory capacity and fluent intelligence were investigated on 40 female and 40 male subjects. Gender differences in neocortical measures are found to be unrelated to cognitive performance. Men and women displayed the equivalent mean level of performance, although they diverged in cortical gray matter capacity, cortical facet, and cortical diam. But one conclusion that is trustworthy with the viewed outcomes is that, on average, female brains may

be more efficient than male brains. Because women achieve the equivalent mean cognitive performance with men, inspite of having less brain tissue. (Escorial et al., 2015, p.360).

THE FEMALE BRAIN IN EVOLUTION

It is important to answer the question that who has succeeded evolution. Therefore, in this section the social selection and sexual selection, the transition to the human structure and the strength that figured the mental structure are examined.

Women in Social Selection and Sexual Selection

There are studies that explain the fundamental role of the female brain in evolution, social selection, and the transition to human structure, which show the same average cognitive performance as men with less brain tissue. This can be viewed in evolutionary theories, which are the other branches of brain studies. Darwin's thesis for sexual selection as declares that female sex selection is the begining of the male generation, is being re-discussed. Intensive scientific investigations that were carried out since Darwin reminded the fundamental role of females in sexual selection (Trivers, 2017). Studies support that women determine the differences in male characteristics through the choices they make and that women are responsible for male characteristics (Ryan, 1980; Andersson, 1994; Jennions & Petrie, 1997; Jones & Ratterman, 2009). Researchers tried to identify the internal processes that regulate female responses in these preferences. Sensory (Endler & Basolo 1998; Ryan et al., 1990; Gentner et al., 2001; Boughman, 2001; Maan & Seehausen 2010), endocrine (Lehrman & Friedman, 1969; Lynch & Wilczynski 2006) and neural (Hoke et al., 2005; Desjardins et al., 2010) processes were examined. Even so, only the early stages of definitions related to mate preference behavior have been reached including determining the coordination of complex gene groups in the brain when women make mate preference decisions (Cummings et al., 2008).

Social selection for women and sexual selection for men explain differences in humanoid brain formation. The neocortex, which is wider in volume in males than in females, is not correlated with male sexual selection, but is correlated with female social selection. Although female sociability depends on increased cognitive abilities, there is no relationship between sociability and sexual selection for males. Instead, sexual selection in males favors brain formation related to aggression, physical competition, sensory impulse functions, and autonomy. On the other hand, female vitality is related to ecological factors and social interactions that ensure the sustainability of resources (Lindenfors et al., 2007, p. 1). (For additional medical explanations, see Appendix 1.

Sexuality and social selection generate sexual dimorphism in brain structures, that is, differences in the appearance of males and females in living things, which can lead to elite kinds. Sexual selection in males and social selection in

females have different effects on the humanoid brain. Degree of male sexual selection reflect an evolutionary history focused on physical conflicts, lacking socio-cognitive abilities. Female sociability, conversely manages the evolution of socio-cognitive abilities. Humanoid brain formation is therefore a product of different gender-specific selection pressures as well as ecological and kinds-specific social factors (Lindenfors et al., 2007). This confirms the views of Ryan (1980), Andersson (1994), Jennions & Petrie (1997), Jones & Ratterman (2009) and that woman evolves the male as a second gender pattern as a result of her sexual preference. In other words, it explains that the historical preferences of women towards sexual role determine the differentiated characteristics of the male gender (Darwin, 1981, p. 31).

Woman in Cultural Evolution

Regardless of everything, man or woman is an inseparable part of nature. We cannot claim that the last human species, Homo Sapiens, was special, because all kinds are sole in each own style. Perchance it is hard to judge between the dance of worker bees carrying pollen to the hive to communicate and guide other worker bees, the song of humpback whales that perform the most beautiful melodies in the animal kingdom, and human intelligence. But the expression "nothing but an animal" for man is as misleading as the expression "created in God's own image". Man and woman as figured human can be described as unique because the affect of human peerlessness on the earth has been gigantic. This unique structure has built an evolution to carry the intergenerational conveyance of erudition and action (Gould, 1996, p. 324).

Human uniqueness principally lives in our brains; it is figured in culture based on our intelligence and the power our brain permits us to utilise the earth. Human communities do not vary as a consequence of biological change, but through cultural evolution. Regarding the fossil record, it is known that Homo Sapiens emerged about fifty millennial before, and there is nothing to suggest the biological changes in brain size or structure. In this respect, according to Gould, Broca's (1873, p. 41) claim that with the further development of the Cro Magnon[3] posterior skull, the overall skull size is larger than ours, and that we are equal in capacity is a correct assumption (Gould, 1996, p. 100).

The greatest transformation we have experienced since the earth's crust solidified about four billion years ago is cultural evolution. Darwin's biological evolution has still continued in the Homo sapiens species, but the pace of biological evolution is rather slow compared to cultural evolution, and its impact on Homo sapiens' history remains small. Our big brain is the biological basis of intelligence, intelligence is the basis of culture, and learned behavior provides inheritance and

[3]They are the first human remains from 43000-45000 years ago, found in Italy and England, and are known as the ancestor of modern humans

change as well as cultural transmission, establishing a more effective mode of evolution than Darwin's biological evolution. In this respect, "Culture alone has the power to impose on nature" (Toulmin, 1977, p. 4).

Evolution and the most important part of our brain, the neocortex, give us some clues about how culture came into existence. Throughout evolution, the neocortex has managed to build an ability that enables the living organism to survive adversity. Human existence and survival is due to the neocortex's ability to strategize, to achieve long-range planning, and other mental tricks. Beyond that, art, civilization, and culture are the fruits of the neocortex. The limbic structures in the brain produce pleasure and sexual desire, the emotions that fuel sexual passion. But throughout biological evolution, the addition of the neocortex to the brain and its connections to the limbic system has allowed the mother-child bond that is the establishment of the family unit, and the long-term commitment and child-rearing that enables human development. Reptiles without a neocortex lack maternal affection; when their offspring hatch, new born baby reptiles have to hide in order to prevent being eaten by other creatures. In humans, the protective emotional bond between parent and child continues through out the long childhood period, when maturation occurs and the brain develops (Goleman, 2009, p. 23).

Anthropologists Morbeck, Galloway and Zihlman also state that in the evolution process, females provide the biological, social and physical environment for their babies with the sense of motherhood in the transition to humanoid structure. Thus, females guide the development of biological maturation and social behavior through genetic life coding (Morbeck et al., 1997, p. 281; Lancaster, 1975, p. 20).

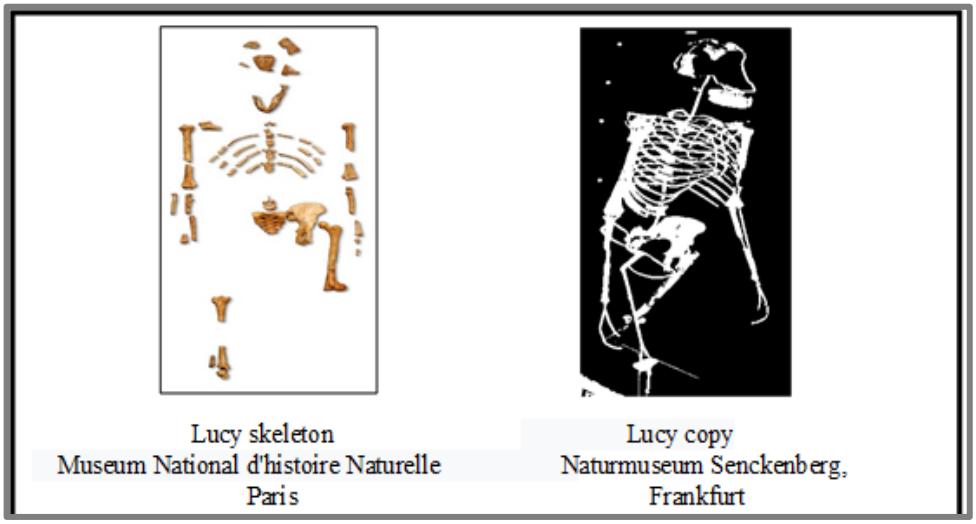
Adults can find out from one to another, but the mother-child relationship is important in creating and transmitting the technique and knowledge of collecting food from nature. As the first representatives of socialization, mothers are important carriers of established group tradition and culture. The social and technical inventions of mothers were transferred to their children and eventually became a part of the emotions and behavior of the group. The basic social unit in humanoid beings, as in other primitive beings, is the mother-child relationship (Lancaster, 1975). This unit still retains its importance in contemporary human groups and is found in all social organizations. The mother-child relationship is the cornerstone of kinship organization, the centre of the ideological structure and the most reliable organizational structure (Tanner, 1974).

Transformation to Human

We have significant evidence that it was the female that initiated the transformation to the human generation, and this is the first hominid fossil. This female fossil, named Lucy, was discovered by Johanson and colleagues in 1974 in Hadar, Ethiopia, and is about 3.2 million years old (Johanson & Edey, 1981). Lucy is an important evidence regarding the social life of the first human model. Lucy's

skeleton, called the Australopithecus afarensis fossil, is exhibited in Paris. Figure 2 below shows Lucy's skeleton and a copy of her.

Figure 2: Image of Lucy



Source: commons.wikimedia.org/wiki

Figure 2 exhibited the copy of Lucy because the image of Lucy is clearly visible in the copy. The girl whose name was mentioned in the Beatles group "Lucy in the Sky with Diamonds" in the celebration held on the evening of skeletion exploration date inspired the fossil to be named Lucy. The Lucy fossil is monolith skeletal bones of an adult female. Johanson and Tim White suggested that the fossil was the bones of a single species, which they named Australopithecus afarensis, and described it as sexual dimorphism. All known hominid species that emerged later are the descendants of this single species (Leakey, 2008, pp. 43-44).

With the development of agriculture, the odds of survival in the most primitive human societies began to change dramatically, and the pressures that kept the human population in check eased. The same pressures made our emotional responses invaluable for survival, ensuring the harmony of parts of our emotional stock (Ekman, 1992).

Under the results of these research findings, it may stated that evolution, social selection, transition to human structure and emotional accumulation are shaped by the female brain, which shows the same average cognitive performance as men despite of less brain tissue. When the search results in this section are evaluated together, the significant impact of the female brain on evolution and culture becomes clear and supports our argument that more women should be at higher management posts and manage the world (Bannò et al;, 2023: Byron and Post, 2016).

WOMAN AND MANAGEMENT

Despite the significant impact of the female brain on evolution and culture, women are evaluated in a lower position in society with a subjective point of view. In this regard metaphors have emerged such as glass ceiling, glass wall, glass cliff, leaking pipe and labyrinth representing the obstacles women face in the business environment and management.

Therefore only few lucky women can reach top management status as a result of their performance. The success indicators of these women have been a valuable topic for researchers to conduct studies and provide scientific data. In contemporary organizations, which are more flat and less hierarchical than bureaucratic organizations, women managers and leaders are frequently agreement makers, conciliators and collaborators. In terms of leadership styles, they are motivating and flexible transformational leaders, the soundness of the group or organization precedes their own interests (Klenke, 2017, pp. 6-7).

The following data may be explanatory about the reasons why women cannot ensure continuity of performance in the business environment and are not sufficiently present in senior management positions:

- Women's lives are a non-linear global phenomenon; represents a complex fabric of individuality, professionalism, social participation and responsibility. Women's leadership and individual advancement are characterized by multiple shining examples and role discontinuities in line with obligation to carry on sense of self. Because women, and especially female managers, typically operate in multiple, interactive, and often non-overlapping environments with their nature, identity issues constantly arise as their roles change and they change in and out of leadership roles. Women leaders manage activities in multiple and different environments such as family, workplace and society simultaneously, and this carries over to be major challenge for them (Madsen, 2007, p. 116).
- Gender is a socially constructed arrangement (Vincent, 2009, p. 300). Society raises women to fit predetermined roles that have nothing to do with their nature. Men determined the psychological basis of women's position in society. The basis of women's secondary status in society is not related to the nature of women, but the roles that society has assigned to them in advance. Women's place in society is problematic because most women are captured and oppressed by men (Wollstonecraft, 2014, p. 86). Women should be defined as people, not sexual beings (Vincent, 2009, p. 301).
- According to Wollstonecraft, women were not allowed to develop their minds and abilities, so women were oppressed in society. Society has educated women in a way that ensures that they have a character appropriate to the position it has predetermined. Their role is to please the man, raise children and manage the house. On the one hand, society expects women to properly fulfill the duties assigned to them, and on the other hand, society has prevented them from receiving the necessary training to fulfill their assigned duties. Such a mentality

is a tyrannical mentality. Therefore, the source of the oppression that women are subjected to is the irrational denial of their right to education and mental development (Vincent, 2009, p. 309).

- The issue of women's position in society is a problem with deep historical roots. Throughout history, women have always been social classes in societies that can be described as oppressed, weak, slave, and they have suffered from this discrimination. Women's problems in societies are problems such as family, motherhood, spouse, sexuality and labor, which the society regards as a primary duty for women, and even as a mandatory duty to be fulfilled by women, in addition to the violence, human trafficking. Consequenyly exploitation and enslavement were arised based on these problems.
- Women have been in a different social position than other enslaved classes to date. Men, unlike the masters of other slaves, wanted women not only to obey them, but also men wanted to possess their emotions. Except for a very small part of the male generation, all of the rest wanted the woman closest to them to be a willing slave, a concubine (Mill, 1971, p .443). Mill states that women have been raised with a submissive character from the earliest ages, in contrast to the characteristics that make people autonomous, such as being independent, self-sufficient, and being able to decide on their own.
- Wollstonecraft, one of the women's rights advocates: “Women have been taught from childhood that beauty is the wand of woman's power; the mind shapes itself after the body, and the woman, wandering about in her gilded cage, cares only for the worship of her prison” (Wollstonecraft, 2014, p. 99). Wollstonecraft states that society teaches women only to please and that they are always ready to fulfill this duty (Wollstonecraft, 2014, p. 117).
- Therefore, it is seen as a divine duty for them to comply with the moral rules of the society, to make sacrifices for their family members, to be loyal to their spouses and affectionate towards their children. A woman is raised with a character that should live not for herself, but for those closest to her, especially her husband. This is already thought to be something in their nature (Mill, 1971, p. 444). Women should stop expressing themselves. A woman should not have any love other than her husband and children, and should devote herself to them. Mill also associates men's enslavement of women with social management and the ambition for power obtained from social management. He states that anyone who wants such power will first want to exert it on those closest to them, that is, their spouse, children and other relatives with whom they live together.
- Marx and Engels state that the division of labor within the family is not equal and fair, on the contrary, this is the first form of ownership that turns women and children into slaves of men (Marx & Engels, 1998, p. 58). Therefore, this ambition of men for power and management is a reason that makes it difficult to solve women's problems and family problems. Mill says that, just as it is difficult to overthrow other forms of power based solely on brute force, it is not easy, but even more difficult, to end the power of men over women, which is based on a

> more solid foundation. Because women are in closer relationships with the men they are subject to than they are with their fellow men. In fact, they are under mens' supervision and control. Women do not have the opportunity to form a unity or a common struggle against the ruling power to which they are subject. Woman live under social pressure to please the men to whom they are subject, to please him, and to stay away from situations that would make him uneasy as much as possible (Mill, 1971, p. 439).

In order to overcome these difficulties, men must give up their ambition for power and women must become braver and more resistant to social pressures (Yoong, 2023; Becker, 2023). Despite the stated difficulties they face, women manage at the global degree in the fields of politics, commercial establishments, information technologies, media, sports, military, faith institutions, education, arts and sciences. Subject to provisional and cultural waves, each of these environments has distinctive features that interact with women's leadership competencies and gender role stereotypes. For instance, earlier, technology was masculine dominant environment that preferred male leaders; but today, in these organizations built on feminine values and where information and communication is intense, talents that offer women the opportunity to lead such as sharing information and transparent communication are sought (Klenke, 2017, p. 13). It could be mentioned that these abilities emerge due to dissimilarities among the effectivity of female managers and male managers and are defined as selection criteria. Today, there are many examples showing that women are in top management positions in politics, business, science, military and many other institutions that shape the world. Late queen of the United Kingdom who has ruled her nation for three quarters of a century with dignity is a good instance in this respect.

Broca's research also supports that the left brain hemisphere is in charge of language and logic (Berker et al., 1986). The fact that women usually have bigger corpus callosum than men should be the reason they are fine at detecting emotional connotations of speech or that they can usually inform turn of events without someone expounding it out, or in other saying, they have strong discernment (Rippon, 2019, p. 36).

In a search examining gender dissimilarities in cognitive abilities according to the aptitude tests between 1947 and 1983 men scored higher on measures of spatial visualization, math, and mechanical ability; it was disclosed that in verbal, arithmetic and figural tests were gender free (Feingold, 1988, p.95).

The larger corpus callosum size in women is due to plenty nerve fibers linking the both two hemispheres of brain (). Therefore, individuals with wider connection areas are superior in activities such as communication and empathy that require rapid information transfer between hemispheres. There are studies on women that explain this situation (Allen & Gorski, 1991; Hines et al., 1992; de Lacoste-Utamsing & Holloway, 1982). Consequently, women exhibit more successful leadership and management activities than men. Female directors may be able to

bring unique experiences, expertise, perspectives, preferences, skills, talents, values and work ethic to boardrooms that male directors may not normally have (Croson & Gneezy, 2009; Adams, 2016; Zenger & Folkman, 2019; Rosca et al, 2020).

CONCLUSION AND RECOMMENDATIONS

In the research, the views that discriminated against the female brain throughout history, the biological differences of the female and male brains in terms of responding to this discrimination, the success of women in management despite being under the compelling influence of discriminations and multiple roles, the impact of the female on evolution and culture were examined. The research results from the literature and the evaluations are as follows:

Research focused on brain weight and volume throughout history has developed a discriminatory view of the female brain as being underdeveloped. However, progressive brain research studies reveal the real biological differences (Goleman, 2011) and explain the superior aspects of the female brain (Escorial et al., 2015; Baron-Cohen, 2009).

- Evolution (Darwin, 1981), emotional accumulation (Ekman, 1992) and culture (Morbeck et al., 1997; Lancaster, 1975) have developed with motherhood, female brain and emotionality, and today's human values have emerged subsequently (Escorial et al., 2015; Goleman, 2009). Despite such important roles in the formation of social structure, women continue to encounter identity problems and contradictions in their social life and management roles. However, data on the management performance of women have been obtained thanks to relatively few women who have succeeded in getting promoted to senior management positions (Klenke, 2017). These data pave the way for more women to take place in management positions through initiating a perception that credits feminine values in organizations.
- Women have achieved evolutionary formation by using brain structures different from men (Lindenfors et al., 2007). Women represent the beginning of evolution. We need to emphasize again that the first 3.2 million year old hominid fossil, named Lucy, found in Hadar, Ethiopia, is concrete proof of this. Various speculations may exist regarding the social life of the first human model. We can see these speculations in the definition of ancient times as hunter-gatherers, the generalization of these definitions made, in order to either completely deny women's roles in evolution or simply to support the roles of men.

In the decade from 1970 to 1979, the interrogation has been raised for "where are the women?". With the efforts of scientists, most of whom are women, women have begun to take their place in the evolution process. Women are still in the betwixt of a reaction resisting to their hard-won gains in many areas of contemporary life (Faludi 1991); they are still considered as the second sex and are positioned behind the male actors of the society. This reversal vortex is in opposition to the growing trend of research fueled by feminism; the research pointed to the fact

that the first hominids were female and were central in social life and evolutionary process (Lee 1968; Zihlman & Tanner 1978; Zihlman 1985; Lindenfors et al., 2007). Notwithstanding the evolutionary role of woman, there is an attempt to hide it in a glass structure held up by an ancient glass ceiling. Lucy is concrete evidence of this fact.

As a suggestion for future studies, the focus of future discussions should be on placing women at the center of society and management. For future studies, the issues of how to change the perspective that excludes, discriminates and humiliates women since the construction of the patriarchal structure should might be investigated. Women, who constitute at least half of the society numerically, break the glass ceilings and struggle on the glass cliffs. Discussion of the tools that women can use to reach higher positions in social status and in management could also be another interesting research topic.

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APPENDIX 1: Structural Dissimilarities of Gendered Brains

According to scientists women's brains are extraordinary and on the rise and there are searches that describe the female brain as extraordinary and determinant of the future (Lee, 1968; Zihlman & Tanner, 1978; Zihlman, 1985; Morbeck et al, 1997; Goldenfeld et al., 2005; Lindenfors et al., 2007; Darlington, 2009; Goleman, 2009; Baron-Cohen, 2009; Lenroot & Giedd, 2010; Escorial et al., 2015). The functions of structural brain differences in corpus callosum, neocortex, basal ganglia, hippocampus, amygdala, and right and left sides of brain etc., which intensify thought and emotionality in women, are important and worth explaining in this regard.

The difference revealed by DeLacoste-Utamsing & Holloway (1982) is not along the corpus callosum, but appears as a wider or more convex region within the posterior as in component of the brain in females. Imaging technology (MRI) studies suggest that gender differences in the brain can be attributed to the dissimilar form for the corpus callosum of women, not a difference in overall size (Allen et al., 1991). In an autopsy study, which the materials obtained from 100 women and 100 men, anterior commissure was reported to be almost 12 percent bigger in women relative to men (Allen & Gorski 1991). The anterior commissure links the both two side moieties of the brain. It plays a crucial in sharp acute pain, contains fine fibers from the olfactory pathways, works to connect the brain halves together with the posterior commissure, which is a white band of fibers and stabilizes the reflex of the retina of the eye to light, and also by connecting the amygdala and temporal lobes, memory, emotion, contributes to the role of speech and hearing. It is also related to smell, instinct and sexual behavior.

The neocortex is the outmost layer of the right and left brain. It plays a part in the management of higher functions such as sensory perception, cognition, position perception, thought and speech. The neocortex accounts for approximately 76% of the human brain mass. Humans, with a larger neocortex than animals, have unique mental capacities despite having nerve anatomy similar to those of the early species. The mental structure of human is built on the developed neocortex (Lui et al, 2011). As reported by Goleman, recent research indicated that brain regions related to self-awareness help in ethics and decision making, and in order to understand this neurol dynamic, it is ımperative to differentiate among the neocortex and subcortical areas, which are defined as the thinking brain.

"*There are centres for cognition and other complex mental processes in the neocortex. The subcortical areas are where more basic mental processes take place, the limbic centres, which are the main emotional places of the brain, located in the lower place of the thinking brain and projected into the cortex. These as are also present in the brains of other mammals. The ancient parts of the subcortex extending to the brain stem and preserving the same structure as reptiles are called the reptilian brain* (2011: 10).

There is an anatomical dissimilarity between the both two side of moieties of the brain (Goleman, 2011: 15):

• The right side moiety has more neural links both in itself and all across the brain, with powerfull links to emotional centres such as the amygdala and subcortical regions in the bottom part of the brain.

• The left moiety has much less connection both inside itself and with other areas of the brain, made up of smooth vertical columns that allow clear differentiation of mental functions but less integration of these functions.

• By comparison, the right hemisphere is structurally more complex.