The Illusion of Explanatory Depth from the Perspective of Gender Socialization

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I truly wanted to publish this book. And here it is. Thank you and enjoy.

Abstract

The illusion of explanatory depth – an unknown term in a known everyday life. Despite the fact that the term 'illusion of explanatory depth' has been coined quite recently, this work proves its importance and the need for further examination alongside with proliferation of the term. The author found it especially applicable to Eastern Europe because this term is rarely mentioned in the literature of these countries.

The purpose of the paper is to define the illusion of explanatory depth and explore this phenomenon from the perspective of gender socialization. Who can access one's knowledge in the most rational way? This is the question that the paper answers. The review of literature is followed by the discussion of methodological techniques that are implemented to analyse and modify the data intended to indicate the level of the illusion of explanatory depth for males and females, comparing their results and providing relevant conclusions. The empirical study on more than 200 international students aims to analyse the results of males and females from the perspective of the field of study one has – social experiment and the data collected by the author proceeded to the apropos conclusion and definition of the hypothesis.

The author managed to prove that gender defines the person's level of the illusion of explanatory depth. The study that was conducted is the starting point for the future examination of further hypotheses.

A review of literature of a different nature helps to confirm the importance and relevance of the topic and the theory of the illusion of explanatory depth entirely.

An aspect of the particular significance of this study is familiarizing readers with the concept of the illusion of explanatory depth, which is scientifically underestimated and not independently widely known on its own. This paper aims to showcase that it is a phenomenon

deserving attention and further scientific research in the field of behavioural economics. It is one of the goals of this paper to encourage further studies based on the paper from the perspective of the classical model of economics pursuing rational consumer behaviour.

Empirical research shows that people have different levels of the illusion of explanatory depth and rationality, hence the same methods of influencing the perception channels cannot be of the same efficiency. The paper has the theoretical and practical potential to be significant for the following fields of research: marketing, sociology, economics, and behavioural economics.

And now, think about a person who is always rational, behaves in the best possible way and analyses all circumstances while in the middle of a critical or stressful situation? Think about a person who is always right – the one who always chooses the best possible option. Think about a person who is never rude because they know it may have its consequences. Think about a person who has never spent a dollar on something they do not really need. Think about a person who has never broken someone's heart and has never been broken-hearted. This person would be called an econ – the one who is always rational in all matters. So? How many friends, relatives, ex boyfriends or girlfriends can you think about? Or do you think it is you – the one who is always right? Behavioural economists agree – none of us is an econ. Do you want to know why? This book is just for you, so welcome to the world where one of the most rational sciences, economics, tells you why all of us are perfectly irrational.

Introduction

People are separated along many lines and in many ways – now more than ever before. There is segregation by age, income, language, religion, ethnicity, personal taste, and, of course, sex and gender. A desire to emphasize the superfluity of the 'who is better' fights, and to show how important it is to understand and accept the differences between males and females in order to achieve a global balance motivated the author to conduct deep research and dedicate the paper to this topic. How much do we know? How much do we think we know? How does the illusion of knowledge, understanding, and explanatory depth keep rising in this era of information surplus? This subject is exceptionally topical nowadays since the world is changing, constantly filled with innovations, but there are still some crucial pillars of the society that are to remain the same. The world is developing or, given the projected crisis, it seems to have paused. Moreover, for global advancement and further development, all aspects of human behaviour, solvency, and knowledge are essential for understanding that there will always be something to differentiate us. Understanding and appreciating the value of these differences, as well as the value of knowledge, lead to healthy versatile global development – among others, this is one of the paper's goals – to share the information and knowledge in order to process the information in a more holistic way.

Economics, with its classical approaches, has long ceased to be neoteric. Not so long ago, compared with the entire history of economics as a science, its new branch emerged in the world and was kindled by the success and celebrity of its discoverers, new research studies and the expansion of the concept of economics as such. This branch is called behavioural economics. There is still a protracted and inconclusive debate going on about the independence of behavioural economics as a science, but the 2017 Nobel Prize received by Richard Tyler confirms the worldwide recognition of this trend. In traditional economics, it was not customary to pay attention to psychology and sociology: it was believed that these were transient, random factors

that faded before the greatness of economic incentives. We live in a world, where all people are equal, but all are individual in their equality. So, would the same assumptions work evenly for everybody? Each social group needs an individual approach to achieve heights not only from the economic perspective but also in other areas of life. At the centre of many sciences, as well as economics, in particular, is a human, so our consciousness, knowledge, and ability to assess and use them duly deserve special attention.

The object of this study is the concept of gender socialization and the illusion of explanatory depth, a relatively little-studied phenomenon dating back to a recent year (2002). The subject of the study is relationships, and the dependence of the illusion of explanatory depth on gender socialization. This work questions the way people access their knowledge, looking for the answers through the study conducted from the perspective of gender socialization. Why does gender play the main role in the research? The importance of sex education is now becoming more and more popular, especially in the majority of European countries, yet the angle of view keeps changing, and gender education becomes a significant issue of a healthy, developing society, too. In addition to sex, the author assumes that children should also be taught what gender is and why it exists, since it is not tantamount to the term sex. This issue is also being discussed within this book. The complication also objectively lies in the fact that many parents of modern children do not see it as vital for them and would rather talk about the importance of using contraception than about gender. To boot, gender affects many aspects of a person's social position, including the assessment of their knowledge, as shown in this study.

In this paper, the author shows how people belonging to the same social group tend to behave and access their knowledge differently with emphasis on a gender perspective. The purpose of the dissertation is to show the priority of further research into the illusion of explanatory depth. Examination of how people differ

depending on gender and so-called mind-sets is another purpose of the paper. The illusion of explanatory depth is not just a theory; there is a lot of excitement about how those who think they know a lot actually know little.

The objectives are as follows: to investigate the theoretical foundations of concepts of the illusion of explanatory depth and gender socialization; to substantiate the relationship between them through the collection and analysis of the database obtained from the experiment; to identify prevailing trends. The objective is also to show that the illusion of explanatory depth, understanding, or knowledge attests to another extensive difference between males and females. All the work is inspired by the basics of behavioural economics and the desire to test how 'rationally' people from the same social group access their knowledge.

The hypothesis of the study is as follows: males abide by the illusion of explanatory depth more than females.

This dissertation consists of four chapters, where the first one deals with the processing of theoretical material on the topic of gender. The literature on the theoretical understanding of the illusion of explanatory depth is described in the second chapter. The third chapter presents the methodology and description of the research: both its goals, purposes, hypotheses, and structure, as well as the research and data collection process itself. The fourth chapter of this book is dedicated to the results and observations of the research study conducted. In the final part of this paper, conclusions are presented. All of the sources used are listed in the bibliography, and all attachments are indicated in the appendix.

Theoretical research methods of the work are as follows: theoretical analysis and synthesis; abstraction and concise display of key content, concretization; creation of a bibliography; annotation denoting a brief record of the general content of a book or article; a quotation, consisting of a verbatim recording of expressions contained in the literary source. Empirical research methods include

three main elements: a research strategy, data collection, and data analysis. The author selects a sample of respondents and each of them is asked to fill in a standardized questionnaire; it involves formal and standardized methods of asking questions.

The novelty of the study lies in the combination of the illusion of explanatory depth with gender socialization, influencing one another. The author shows the relationship found during the experiment and the empirical study conducted during the work.

In the framework of this dissertation, a sociological study was carried out to identify the relationship between the illusion of explanatory depth and gender socialization. Also, the work covers the existing theoretical ideas about the illusion of explanatory depth and gender in general, with references to various aspects of this topic. The data obtained during the study expand the understanding of factors of the illusion of explanatory depth and gender socialization.

The materials of this study may be used in a further study and investigation of the illusion of explanatory depth and gender studies through the prism of modern society, as well as the foundations of behavioural economics in general. The author's research aims at linking the illusion of explanatory depth and gender can be used in the practical activities of sociologists in this field. Besides, this paper may become the basis for further research and analysis of new hypotheses derived from this study. New data are used for the results and observations, which makes the outcome of the work an adequate reflection of the illusion of explanatory depth from the perspective of gender socialization. In this case, the assessment of general knowledge has been chosen, but the data are universal in nature and allows for their use in further research.

Information about objects of research is divided into two types: primary and secondary information. Secondary information covers studies of published information sources (books, other official publications, and articles); analysis of sources, as well as writing a review of sources in the literature review section.

Primary information, in its turn, is actual data collected during the experiment, data verification and analysis. The author decides to carry out personal empirical research the purpose of which is to complete the examination based on the new results obtained, as well as to reject, or not to reject, the hypothesis. The entire data presented in this work, except the literary review, is collected and processed by the author of the work.

Chapter 1

Gender and how it affects our behaviour

1.1. On the biological and social nature of gender

Gender is between your ears and not between your legs[1].
Chaz Bono

Sex, gender and the crucial distinction between these two terms that people often confuse or underestimate one to the detriment of the other. Generally, sociologists use the term *sex* to refer to the anatomical and physiological differences defining male and female creatures (William, 2014). Term *gender*, conversely, concerns the psychological, social, and cultural differences between males and females (Eagly and Wood, 1991). Gender is linked to socially constructed notions of masculinity and femininity and is not ineluctably a direct outcome of an individual's biological sex. When talking about gender, sociological usage is importantly different: *sex* is used for the biological differences between women and men, and *gender* is used for the packages of social characteristics that are culturally associated with the sex difference. Some people believe they were born into the wrong bodies and seek to 'put things right' by changing their gender or following the lifestyle or dress of the other sex (Lundeberg, 2014). The dissimilarity between *sex* and *gender* is fundamental from the perspective of current research since many differences between males and females are not biological in origin. Contrasting approaches have been taken

[1] Chaz Bono on GMA: Gender It Between Your Ears, Not Between Your Legs, https://www.youtube.com/watch?v=rGr8vl0vlfg (accessed 8.12.2021).

to explain the formation of gender identities and social roles based on those identities. Sociological elucidations of gender differences and unevenness have taken contrasting positions on this question of sex and gender (Giddens, 2006).

The same dissimilarity can be carried on by using the terms *female* and *male* when knuckling down to the biological elements of divergence, and *feminine* and *masculine* when considering socially generated distinctions. Specifically, what of masculinity and femininity is brought about by biology is a debatable issue, both in the social sciences and in the illogical world at large. The lion's share of sociologists would quarrel that while 'maternity' is a biological fact, a 'maternal attitude' is a socially certain cultural assembly: different cultures draw up different kinds of roles and attitudes as being proper and apt for mothers (Bruce and Yearley, 2006). Nevertheless, as with a lot of sociological investigations on the importance of biology in an area of determining human nature and behaviour (for instance, in people's understanding of inheritance and mental illness), there is always a hazard that advances in biology may reduce the scope for the sociological explanation.

Gender differentiation is a social flow by which biological divergences are given social and cultural significance and are used as the essence for social classification (William, 2014). Cultures may make more or less of biological deviation exhibiting that gender differentiation cannot be considered as a manifestation of sex differences and social life. At the same time, one should be beware of the extreme social constructionist view that gender distinctions have no biological nuts and bolts. It may be put the following way: very few societies come to mind that have inverse roles and characteristics, so that males are expected to be 'feminine' and females – 'masculine'.

1.2. Equal is not the same

No one will ever win the battle of the sexes;
there's too much fraternizing with the enemy[2].
Henry A. Kissinger

'Gender equality, equality between men and women, does not mean that women and men have to become the same, but that rights, responsibilities and opportunities shall not depend on whether one was born male or female. Gender equity means fairness of treatment for men and women according to their respective needs. This may include equal treatment or treatment that is different, but which is considered equivalent in terms of rights, benefits, obligations, and opportunities' (United Nations Educational, Scientific and Cultural Organization).

During the discussion between the psychologist and author Jordan Peterson and Sophie Walker, the leader of the Women's Equality Party in England, some imperative facts on the topic were found. Sophie said that equality meant freedom, talking about the equality of the outcome and equality of choice, claiming that equality is better for everyone, and that the whole society can follow the right planned path when it is done. What Peterson was saying was that people choose different things which is what they are doing in Scandinavia. So, Scandinavian countries have moved towards gender equality more than any other countries, and the personality differences (characteristic patterns of thinking, feeling and behaving) in Scandinavia increased rather than decreased. The proportion of women who are choosing STEM (Science, Technology, Engineering and Mathematics) fields has decreased rather than increased. So, as culture becomes gender neutral, the number of women who choose

[2] Lubbock Morning Avalanche, 1994. (Short untitled item), Lubbock: Robert Granfeldt.

STEM fields decreases. As countries become more egalitarian, the difference grows, not shrinks. 'It was a shock to everyone to find that out', said Peterson. Men and women are more the same than they are different, but the issue is that small differences in the population level cause very large differences at the extremes. For instance, men and women are broadly similar with regards to regression, although men tend to lay more towards aggression, so that if a random person out of the population is picked, and there is a guess that the male was more aggressive, it will be correct 60% of the time. But if one in a hundred most aggressive people is taken, they are all male, explaining the overwhelming proportion of people who are in prisons being male. At the same time, 99% of bricklayers are male, and three quarters of the population now in universities of humanity and social sciences are female. Men work longer hours, work more dangerous jobs, are more likely to move and to work outside, and so forth. It all seems to be hidden under the idea that the 'reason' that men and women make different amounts of money is because of their gender, which seems to look like a quite simplistic analysis. Another thing is a biological difference which affects women's career prospects strongly because, biologically, it is women who have babies (Peterson and Walker, 2018).

Debates on the question whether men's brains are wired differently from women's are still ongoing. This topic is particularly hot now, when, in some countries, there are more than 10 types of gender, but it is another story that is also described in this work. 'Male brains have more connections within hemispheres to optimize motor skills, whereas female brains are more connected between hemispheres to combine analytical and intuitive thinking' (Lewis, 2003). 'On average, men connect front to back [parts of the brain] more strongly than women', whereas 'women have stronger connections left to right', said a study of the University of Pennsylvania medical school. In the study, the brains of 949 young people aged 8 to 22 (428 males and 521 females) were scanned. All

in all, 'the back of the brain grasps perception and the front of the brain – action; the left hemisphere of the brain is the seat of logical thinking, while the right side of the brain begets intuitive thinking. The records support the notion that males may excel at motor skills, while women may be better at integrating analysis and intuitive thinking. It is fascinating that we can see some of the functional differences in men and women structurally' (Verba, 2014).

To show better how men's and women's brains differ, there is a brief infographic explanation of this matter in Appendix 1, together with a visualization of how male and female brains look like at rest in Appendix 2. 'Women will tend to want to interact with colleagues after a stressful meeting or interact with family, friends, and relatives at the end of a busy day. These activities help women produce oxytocin, increase relaxation, and relieve stress, which itself produces even more oxytocin, a critical stress-reducing hormone', wrote Annis and Nesbitt, the authors of the book *Results at the Top: Using Gender Intelligence to Create Breakthrough Growth* (2017). It must be noticed that there are always exceptions to findings, and the purpose of mentioning these tendencies is to help understand how two genders, male and female, tend to think, behave, and act.

Surely, there are arguments against these theories, like, for instance, that neurosexism, a theory that claims that men and women have different brains, is a myth. However, Lise Eliot, Professor of Neuroscience at the Chicago Medical School at Rosalind Franklin University of Medicine and Science and the author of the book *Pink Brain, Blue Brain: How Small Differences Grow Into Troublesome Gaps* (2009) and the one who is against the 'different brains' theory says that people remain strapped in the 'biosocial straitjackets' that divert a basically unisex brain down to one culturally gendered pathway or another.

1.3. Sex vs. gender

I confused gender identity with sexual orientation. Your gender identity is about who you are, how you feel, the sex that you feel yourself to be. Sexual orientation is who you're attracted to[3].

Chaz Bono

Sex and *gender* are quite often mistaken one for another. The term *sex* refers to the physical and anatomical characteristics considered to distinguish male and female bodies from each other; these include differences in their chromosomes, reproductive organs, hormones, and physical appearance (Barkan, 2016). Sex refers to biological differentiations between females and males that are determined at the moment of conception and develop in the womb and throughout childhood and adolescence. Females, of course, have two X chromosomes, while males have one X chromosome and one Y chromosome (Anon, 2021). *Gender*, in turn, refers to differences in the way that men and women in a particular society are expected to feel, think, and behave. Thus, males are typically expected to feel, think, and behave in a masculine way, and females in a feminine way (Scott and Fulcher, 2011). Gender is a social concept. It refers to the social and cultural differences a society assigns to people based on their (biological) sex (Barkan, 2016).

It was thought at one time that sex determined gender, that differences in the way that men and women behaved were biologically rooted in their sex. However, differences in their occupations were seen as resulting from differences in their biological make-up that equipped them for very different kinds of work (Barkan, 2016). Nurses were women because women were naturally more caring than men, while soldiers were men because men were naturally more aggressive.

[3] Chaz Bono on GMA: Gender It Between Your Ears..., cited source.

While some people still hold these views, it is hard to explain the different occupations of men and women. Many occupations that were once regarded as a male or female preserve have been opened up to the other sex. If women can become competent nurses, the fact that nurses are predominantly women and soldiers are mainly men cannot have a biological explanation. Gender must, therefore, be distinguished from sex (Fulcher and Scott, 2011).

Gendering sex is another issue, too. Judith Butler, a philosopher, reserved the notion that sex determined gender by arguing in her influential book *Gender Trouble* (1990) that gender did have sex. Judith rejected essentialist ideas which treated men and women as having a fixed and opposite character, ideas that were bound up with a 'stable and oppositional heterosexuality'. The author is very critical of those feminists who think that all women have the same underlying character and share a common identity. Indeed, Butler was opposed to the whole notion that there was some inner male or female self that made us think and behave in male and female ways. The author claims that sex is shaped by gender discourses, which prescribe male and female ways of behaving by providing 'scripts' that people then perform. It is the repeated performance of actions according to these scripts that makes bodies male and female. The concept of *performativity* was developed to describe the formation of the character of men and women through these repeated performances. For instance, dominant concepts of masculinity provide a male script, emphasizing physical toughness, which men are expected to display. This leads men to develop their muscles and engage in physical aggression, by, for example, using their fists to resolve conflicts. 'Performances' like these lead to the result of men appearing more muscular and physically aggressive than women, and this could be seen as an external manifestation of their nature. Physical toughness comes to be regarded as a biological characteristic of the male sex, but it is rooted in the repeated acting-out of beliefs about how men should be.

While sex and gender should be conceptually distinguished, sex characteristics should not be seen as independent of gender identities, for these identities specify the characteristics that the bodies of men and women should have, according to Fulsher and Scott (2011). Gender conceptions of maleness and femaleness that require men and women to have different bodies led to the adoption of dieting and exercise regimes, cosmetic surgery, and other procedures to exaggerate the biological difference between men and women.

Comprehension of gender practices and structures is easier if there is a split into three conceptually distinct categories that are as follows: sex (biology, physiology), sexuality (desire, sexual preference, sexual orientation, sexual behaviour), and gender (social status, position in the social order, personal identity), (Diamond, 2002). They differ, however, each of them is socially constructed. Gender is an overarching category meaning a major social status that organizes almost all areas of social life. Conceptually separating gender and sex makes it easier to understand what gender is, since it is crucial to understand that those two are not the same. It is also easier to explain how female and male bodies are socially constructed to be feminine and masculine if gender is separated from sex (Borgatta and Montgomery, 2000).

There is still a long path of 'sex and gender education' in many countries, not new for the USA, but quite new for Eastern Europe. For many in the USSR, the word *sex* used to be almost indecent, and the ideology in those days was against public affection and intimacy before marriage. On 17 July 1986, the world discovered that there was 'no sex in the USSR' during a television talk show between audiences in the United States and the Soviet Union. To be precise, a lady from the show said that they did have sex, but they did not have advertisements or popularization of the term. At the same time, it still cannot be argued that the word 'sex' has been consistently considered almost dirty, nearly synonymous with pornography. It has taken a while, but 'sex-talks' with teenagers are only just

becoming widespread now. a nice example of this topic is a British comedy-drama series *Sex Education* released in January 2019. It took the whole world by storm with the easiness and openness, and it combined a fun plot with the crucial importance of the sex world that every teenage must negotiate before embarking on a process that begins with the letter S and which is still not a word spoken loudly in Eastern Europe. But how is it interlinked with gender? The angle of view has changed, and everyone seems to have forgotten that children, in addition to sex, also should talk about what gender is and why it exists. Another example for this case may be a Spanish TV series released in 2018, *Elite*, that highlights important aspects of gender identif ication and that one can easily change from one sexual preference to another. It brings attention to the fact that it is not the sex of the person that decides who to be attracted to, but gender – circumstances such as society, time period, and relations with other people. The ease of switching from being attracted to a male to being attracted to a female may seem controversial and even wild for some people with the religion-oriented or post-USSR mentality, but it does not remove the fact that topics like this should be discussed more, helping the young generation get familiar with these issues. It should be mentioned that this is not about the popularization of these matters, but awareness. The complication, objectively, also lies in the fact that many parents of modern children do not see this as important for themselves, not mentioning their children, and would talk about the importance of using contraception rather than gender.

1.4. Gender identification

One is not born, but rather becomes, a woman[4].
Simone de Beauvoir

The term of *gender identity* generally refers to the sense of 'self' associated with gender; it designates the psychological internalization of feminine and masculine traits (American Psychological Association, 2015). Gender identity comes to light out of compound patterns of interactivity between the self and others. Some people are born with a blend of the quintessential biological characteristics from both sexes; in such cases, medical professionals may determine the 'proper' sex and interfere correspondingly. From a sociological standpoint, gender identity embraces all the meanings that are a ppertained to oneself contingent on one's gender identification (Burke, 1980). The masculine and feminine gender identity is hinged on the meanings people have epitomized from their association with the role of male or female, jointly, in society. Since these are self-meanings, they cannot be directly espied; they must be elicited from behaviours and expressions people are involved in. Gender identity is one of the many role identities people grasp. In sociology, it is assumed that roles do not linger in isolation, but they presuppose and are associated with counter roles (Lindesmith and Strauss, 1956). For instance, the role of a teacher takes on meaning in connection with the role of a student, the role of a mother takes on meaning in relation to the role of a child, and so on. The same is true of identities. From the author's point of view, there are crucial pillars of the natural formation of the gender identity: parents' attitude to each other, attitude to the child, mother's and father's

[4] de Beauvoir, S., 1986. Witness to a Century. New Haven: Yale University Press, pp. 35–49.

self-identity, their strength and stability to support the formation of child's self-identity, etc.

There are two most commonly used personality tests measuring the degree to which an individual exhibits traits or behavioural features traditionally associated with male and/or female poles of gender identification. The first one is Bem Sex-Role Inventory (BSRI). Bem Sex-Role Inventory is a scale developed by an American psychologist Sandra Bem. The scale consists of 20 points, closely related to the traditional opinion about masculinity, and another 20 points, similarly associated with femininity. The questionnaire also includes an androgyny scale, which reflects the degree of correlation of the subject's identifications with classic masculine and classic feminine traits. Respondents indicate the degree to which a series of descriptions are true about them. Examples of these descriptions for the masculine are 'acts as a leader', 'makes decisions easily', 'willing to take risks', and other (Davis and Rogers, 2017). The BSRI test may be found in Appendix 3.

The second main test is the Personal Attributes Questionnaire (PAQ), which is a personality test that measures two scales of 'instrumentality' and 'expressiveness' called masculinity and femininity, respectively. This is one of the most commonly used indicators of gender identity, second only to the inventory of Bem's sexual roles. This testing was first developed by Janet T. Spence, Robert Helmreich and Joy Stapp in 1975. In this kind of testing, respondents rate themselves on a number of bipolar points. For the masculine scale, elements range from masculine to not masculine, while elements for the feminine scale range from feminine to not feminine. Examples of these items from the masculine scale are 'very independent' vs. 'not at all independent'; 'can make decisions easily' vs. 'has difficulty making decisions'. The feminine scale, at the same time, includes bipolar items, for instance, 'very emotional' vs. 'not at all emotional' and 'very helpful to others' vs. 'not at all helpful to others'. It should be mentioned that PAQ also has

a third scale called androgynous. It was prompted by a small (in previous times) difference between the masculinity and femininity scores, representing balanced levels of these two characteristics (Bem, 1974; Spence and Helmreich, 1978). The PAQ test is attached as Appendix 4.

Gender identity forms with the age of the child. From the early childhood, the labels 'boy' or 'girl' are applied to the self. However, it should be mentioned that society is now moving away from the idea of instilling in a child or imposing on them that they belong to one or another gender. There are more than 2 genders now accepted in a lot of countries. Examples of those can be transgender, gender neutral, non-binary, agender, pangender, genderqueer, two-spirit, third gender, and all, none, or a combination of these. For instance, since 2013, it has been allowed in Germany to leave the gender field on the birth certificate blank. Also, according to the bill which is planned to come into force after it has received the approval of the Constitutional Court of the country, the parents of a new-born child will be able to choose the third option, in addition to the female and male, the one without gender signs. The abolition of dressing rooms and toilets for ladies and gentlemen, and the removal of all elements referring exclusively to men and women from some sections of clothing and footwear can already be observed in Germany. According to one of the articles of 23 October 2017, published in *The Times*, one of the world's leading newspapers, the British government is asking for the term 'pregnant women' to be replaced with 'pregnant people' in the United Nation documents to include transgender people. As the reader can see, the world is moving from the binary to a more diversified perception of gender identity. This work, however, covers the classical (old-school for some) understanding of gender and two of its main types, namely, female and male.

1.5. Gender role

Gender is the poetry each of us makes out of the language we are taught[5].
Leslie Feinberg

The external partner of gender identity is the gender role. Gender roles are formed by culture and depend on the historical era. They include social norms that contain stereotypes, prescriptions and prohibitions regarding what men and women should feel and do. In some societies and cultures or religions, differences between women and men are accentuated; in others, they are practically levelled. Gender roles are the social presupposition that society fastens to gender and their expression, for instance, in speech, demeanour, gesture posture, and dress. In many societies, gender roles are markedly carved up and form the principal categorization within social life. Gender roles might encompass women investing in domestic roles and men investing in worker roles (Eagly, 1987). A gender role, in other words, is a set of social norms that determine what types of behaviour are considered acceptable, suitable or desirable for a person depending on their gender, that is, belonging to women, men or another gender. The mismatch of human behaviour with a gender role is called gender nonconformity. In different cultures, the number and specific content of gender roles vary significantly, but there are widespread cross-cultural similarities (Chappell, 2016; Korabin et al., 2008).

According to the World Health Organisation's website, gender has implications for health across the course of a person's life in terms of norms, roles, and relations. It influences a person's risk-taking and

[5] Groat, K., 2018. Poet Andrea Gibson Shares How They Learned About Their Gender Identity Through Writing, https://www.seventeen.com/life/a20102112/andrea-gibson-interview-on-poetry/ (accessed 19.12.2021).

health-seeking behaviour, exposure to health risks, and vulnerability to diseases. Gender shapes everyone's experience of health care in terms of affordability, access and use of services and products, and interaction with healthcare providers. Gender refers to the roles, behaviour, activities, attributes, and opportunities that any society considers appropriate for girls and boys, and women and men. Gender interacts with but is different from the binary categories of biological sex.

Men are tough and have the role of providers; women are nurturers and are in touch with their feelings. It is the twenty-first century, but these and other stereotypical beliefs about gender differences remain strong. They found an empirical example of what the situation of the modern world is like in the research from the Ipsos Group, a global market research and consulting firm. According to their research from 2017 targeted on adults aged 16/18–64 across Argentina, Austria, Belgium, Brazil, Canada, China, France, Germany, Great Britain, Japan, Hungary, India, Mexico, Peru, Poland, Russia, Serbia, South Africa, South Korea, Spain, Sweden, Turkey, Italy and the United States, four in ten women around the world said they did not have equality with men or the freedom to reach their full dreams and aspirations. It was an international sample of 17,551 adults, and the data were collected to match the profile of the population. Respondents were asked the following question: 'To what extent do you agree or disagree with the following statement: «In my country, I have full equality with men and the freedom to reach my full dreams and aspirations»?', and the results were the following: 21% answered 'agree very much', 40% – agree somewhat, 28% – disagree somewhat, 12% – disagree very much. The pie chart of the results is shown in Appendix 5. It is worth noticing that women in Spain, Japan, South Korea and Turkey feel they lack equality the most, while in Russia, China, India in Canada it is the opposite. 'Most believe in equal countries, but few think they exist': 72% of all respondents claimed they believed there was currently an inequality between women and men in terms of social, political and/or economic rights in their

countries (28% of agree very much and 44% of agree somewhat), (Appendix 6). Women are more likely than men to believe inequality exists, according to Ipsos (2017). At the same time, in Canada, Spain and Great Britain, there were just 8% of those who thought women should just stay at home. They accounted for 30% in Russia and 44% in India.

1.6. Gender identification development: theory and evidence

We've begun to raise daughters more like sons... but few have the courage to raise our sons more like our daughters[6].
Gloria Steinem

There are a couple of theories that interpret the development of femininity and masculinity. This paper covers the following three main ones: psychoanalytic theory (Freud, 1927), cognitive-development theory (Kohlberg, 1966), and learning theories that state that individuals develop gender by imitating role models (Mishel, 1966; Weitzman, 1979). In spite of inconsistencies between the aforementioned theories, all of them assume a two-stage process of gender differentiation. At the first one, the child gets to know that she or he is female or male. At the second stage, the child gets to know what it means to be female or male in terms of femininity or masculinity.

According to Freud's theory, the child identifies themselves with the same-sex parent. This theory should be supported with psychosexual development, which has 5 stages: oral, anal, phallic,

[6] The Female Lead, 2021, https://twitter.com/the_female_lead/status/1362029552088862720 (accessed 8.12.2021).

latency, and genital. In a nutshell, by about the age of 3, the child develops a strong sexual connection to the opposite-sex parent. As a result, there is the appearance of negative feelings to same-sex parent rooted in resentment and jealousy (McLeod, 2019). There are a lot of scientists against this theory, though, and there are also researchers who formulated this theory more specifically, claiming that mothers play an important role in gender-identity development (Cherry, 2019; Chodorow, 1978*)*. According to Chodorow (1978), mothers are more likely to relate to their sons as different and separate since they are not of the same sex. At the same time, when it comes to daughters, women experience a sense of oneness and continuity with girls, since they are of the same sex. As a result, mothers bond with their daughters, hereby fostering and nurturing femininity in girls. Accordingly, mothers distance themselves from their sons, who respond by shifting their attention toward their fathers. As a consequence, masculinity is gained through their fathers. According to studies by Storms from 1979, the meanings of masculine and feminine are necessarily contrastive. To be masculine (male) is to be not feminine (female) and vice versa. It is interesting to mention the observation of Biernat from 1991 that children originally do not consider these 'masculine' and 'feminine' characteristics as opposite, but as they get older, their views of gender become progressively bipolar.

When it comes to the cognitive-developmental theory by Kohlberg (1966), it is based on the analogous idea that certain critical events have a lasting effect on gender-identity development. In contrast, Kohlberg's theory events are seen as cognitive rather than psychosexual originally. Unlike the psychoanalytic and learning theories (the latter is going to be described next), the cognitive-development theory sees gender identity development as preceding rather than following from the same-sex parent model of behaviour. This theory claims that once the gender is established, the self is 'motivated' to display gender-conforming attitudes and behaviours even before the same-sex

modelling takes the lead. Same-sex modelling bluntly moves the action forward. This theory suggests that as the child gets older, the understanding of gender becomes more sophisticated. There are three stages in Kohlberg's theory: gender identity, gender stability, and gender constancy. The gender identity stage takes place when the child is aged from two to three. They can label their own and others' gender correctly based on external appearance, for instance, clothes and hairstyle, but it is crucial to highlight that they do not understand that gender is fixed over time and situation. A boy playing with dolls is recognized as a girl in this stage. The gender stability stage takes place when the child is between three and four years old. At this age, they understand that gender is fixed across time, but do not understand that the same applies to others. Also, they still rely heavily on external appearance, so if their dad dresses up as a lady for a fancy dress party, he would be recognized as a female. The gender constancy stage, in its turn, takes place when the child is six years old. At this stage, they understand that gender is fixed across time and situation despite external appearance changes. For instance, a female who has short hair and does a 'masculine' job is still female. At this stage, the child prefers same-sex playmates and gender-stereotyped activities: wearing lipstick like her mother and shaving in the mornings like his father. So, this is observed that 'copying' from the same-sex parent is just part of the third stage, but the gender identification itself happens naturally.

Among the entire scope of theories devoted to gender identity development, the learning theories put the strongest emphasis on the social context. In other words, it is the social environment of the child, such as parents, grandparents and teachers, that shapes the child's gender identity and general understanding about why girls and boys not only have different body parts , but also they feel different in themselves; and why it is normal and healthy to feel differently from the representative of the opposite gender (Mascolo, 2019). Parents and teachers (since these two groups are the most often observed people for a child) instruct the

child on femininity and masculinity, either directly through rewards and punishments or indirectly through acting as models to be imitated and models to take the behaviour from. What to wear, how to play (toy preferences, choice of objects), and how to behave are the questions of rewards and punishment stories. There are some understandings (some call them stereotypes or even frameworks) that are imposed on children by society since their early childhood. Those are, for instance, girls in dresses, boys in trousers, dolls for girls, trucks for boys, passivity and dependence for girls, and aggressiveness and independence for boys. However, from the author's point of view, the model of 'passive and dependent' girls is slowly fading away. When it comes to indirect learning of one's gender 'model', it emerges from modelling same-sex parents, teachers, and peers of models in the media. The latter has been particularly the case in the recent times . Children imitate rewarded models' thoughts, feelings, behaviour, habits, etc., since they anticipate that they will receive the same rewards that the models have received.

Susanna Zuchelli, the General Manager of HERAtech S.r.l. and Hera Group Diversity Manager, is an activist in the gender field. She was the first woman to become CEO of a logistics company in Italy. Susanna was a speaker during the international conference 'Employers of Central and Eastern Europe. Thirty years of experience and the future', in Warsaw in 2019, where the author happened to discuss the topic with Ms Zuchelli. The panel during which Susanna was speaking was dedicated to the topic of successful women and covered different aspects of modern approaches and leverage of the development of women's position in the labour market. Speakers were women from different sectors in European countries. Topics related to the gender issues at work were being discussed, and then, suddenly, Susanna said a momentous thing. 'Why do you talk to women about it?' In Susanna's opinion, it is simply a wrong path to discuss the 'glass ceiling' with women only. She compared it to talking to the mirror. Susanna is a founder of

the project called Inspiringirls the purpose of which is to tell and teach girls about their rights (including gender) from the school age, so they are able to know their real status when they become part of the labour force. She claims that when it comes to work and, especially, wage self-assessment, women expect 30% less than men for the same scale of tasks. Why so? She presented graphs from her Inspiringirls project, saying that the lack of self-confidence, pressure of gender stereotypes and limited access to female role models affect girls around the world. According to the graph, 67% of young women aged 11–21 think women do not have the same labour force opportunities as men, 30% of girls aged 11–16 think STEM (Science, Technology, Engineering and Mathematics) subjects are just for boys, 55% of girls aged 7–21 say gender stereotypes affect their ability to say what they think, and 30% is the amount girls' confidence drops between the ages of 8–14. She added that when it comes to the gender issues in the labour market, it is men who should talk it over and it is men who women should have conversations with, so it does not feel like talking to the mirror. During the panel, Ms Zuchelli received great support on this issue from Erol Kiresepi, the President of the International Organization of Employers (IOE), who has his own business in Turkey and who said that of eleven directors in Istanbul that he had hired five were women. During conversation between the author and Mr Kieresepi, the President of IOE said that the salary should depend on how well he or she (and this clarification does not matter at all) manages to use their skills and do the tasks. Sure thing, there is a constant development on this issue, especially in European countries and in the US, but still, based on the statistics from 2019, women in Germany and France do earn less than men in similar positions, so there is still a lot of room for improvement.

1.7. Androgyny as an alternative way of gender identification

I was born with the wrong body, being feminine by gender but male by sex,
and I could achieve completeness only
when the one was adjusted to the other[7].
Jan Morris

Androgyny is an amalgamation or balance of masculinity and femininity, giving the feasibility that individuals can express and indicate both (Palmisano, 2000). Instead of conceptualizing masculinity and femininity as opposite ends of a continuum, these two patterns in androgyny are discrete facets that can be finely merged. People can be masculine, feminine, or both, i.e. androgynous.

In the BSRI personality test that is described in chapter 1.2, there are mentions of androgyny. In his works, Bem, the creator of BSRI, mentioned gender schematization as an important point for understanding how androgyny differs from exclusively masculine and feminine representatives. Gender schematization is an internalized tendency to see the world in gendered terms, according to Palmisano (2000). The person who is gender-schematic sorts stimuli into *male* or *female*, and not into other categories in line with other dimensions available. Therefore, those who score high on one of these extremes, masculinity or femininity, are gender-schematic, since they tend to organize information along gender lines. Androgynous people, at the same time, are gender-aschematic.

But what does it mean? Androgyny is not a new term, and a lot of people have certainly heard about it, but how does it happen and what is the difference between being gay, transgender, transvestite,

[7] Kornblum, W., 2011. Sociology in a Changing World. 8 ed., revised. Boston: Cengage Learning.

transsexual and androgynous? To have a better understanding of what the difference is, we should define these terms. In a nutshell, *gay* describes a person sexually or romantically attracted to a same-sex person. The term *g ay* is ofte n used to refer to men only, but it should be mentioned that it is a common term for gays, lesbians, bisexual or even transgender people. *Transgender*, in its turn, means a state of identity when the gender assigned to a person from birth does not correspond to the gender that they feel themselves to be. That is, for example, if a person was born a boy, but really feels like a girl, they are *transgender*. *Transvestite* or *crossdresser* (a more acceptable term in our time) refers to a person who dresses and behaves in the style of the opposite sex. At the same time, for instance, a man who wears dresses can still identify himself as a man. That means that both cisgender and transgender people can be crossdressers. The famous post-soviet transvestite, Verka Serduchka, is Andriy Danylko in real life. He engages in crossdressing, but it does not necessarily correlate with the sexual or romantic preferences of the show man. *Transsexual* refers to people who have undergone any medical intervention in order to make their appearance match their gender, for example, surgery or hormone therapy. However, this term should be used with caution as not all transgender people use it to describe themselves.

A question and answer interview released on YouTube on 23 September 2019 is considered to be worth the reader's attention, too. During the video, three androgynous persons were asked the same private questions. After the question 'Do you feel like a man or a woman?', one of the respondents said: 'I feel like Andrew. I understand that I am a boy, but I feel like a human being, Andrew, and it is only later that I think about the differentiation'. Another answer was: 'I am certainly a man. I can look however I like, what matters is my decisions – the main thing is to make my actions clear, confident, and to make them bear the responsibility. A man is known through his actions'.

Being or becoming androgynous has been growing in popularity recently, and at some point it has beco me 'fashionable' to be

androgynous. It is all over social media, so at the stage of gender identity forming, it is very important for parents and surrounding society in general to 'direct' a teenager whose psyche is quite malleable to various kinds of trends. During one of the interviews, Lady Gaga, one of the most famous American artists, said that she does not feel clearly male or female; afterwards, the singer received an unofficial status of an androgyny icon. Another famous couple of androgynous-looking boys are the Kaulitz brothers, Bill and Tom, soloist and guitarist of the Tokio Hotel band. At the same time, it should be said that Tom has a wife, Heidi Klum (now Kaulitz), a world-famous supermodel. Gwendoline Christie, a British actress, said during one of her interviews that because of her male looking face and her height, she had been patted down by a man at the airport more than once. Another example of an androgynous person is LP (real name Laura Pergolizzi), a famous singer who calls themselves gender-neutral.

It is crucial to mention again that there are huge differences between the above terms, and you should be very careful when using these words and know their exact meaning .

1.8. Gender socialization

Socialization gives us the tools to fill our evolutionary roles. They are our building blocks[8].
Warren Farrell

Gender socialization is the learning of gender roles with the help of social agencies such as family and the media. This kind of concept

[8] Svoboda, S., 1997. An interview with Warren Farrell, http://www.menweb.org/svofarre.htm (accessed 8.12.2021).

makes a discrepancy between biological sex and social gender, an infant is born with the first and develops the second (Giddens, 2006).

Chiefly, it is not yet clear how the recent influx of women into the labour force and the trend for younger women to combine job and family roles will alter the female life course in adulthood, besides increasing its diversity. At this point, women still tend to be more identified with family life, more centrally defined by family commitments and priorities, than men are. A study of four groups of men and women found that, at all stages, men were essentially career-oriented, while women prioritized and set their primary goals for marriage and family – whether or not they were involved in careers (Lowenthal et al., 1975). All in all, a woman's roles at different stages of the family life course will tend to determine her roles as an individual to a greater degree than it is in the case of a man.

Even if women do not go through specific stages in as predictable a way as men, they seem to go through similar types of changes eventually. According to a longitudinal study of 132 graduates in a woman's college in California, Mills College, women became more committed to duties and more self-disciplined in their twenties; more confident, assertive, and achievement-oriented in their thirties; and more generative and involved in affairs outside the family in their forties. The study also found that those women who were committed neither to the family nor to career changed less over their adult years than committed women (Helson, Mitchell and Moane, 1984).

Gender issues like roles, socialization, and the general understanding are learned through the process of socialization, which begins in the family and continues through education, and indeed throughout life, for agencies of socialization, such as the media, continue to shape people's behaviour long after they have become adults. This idea described in the book *Sociology* by Fulcher and Scott is highly supported by the author of this paper, since it is assumed that the whole journey of self-gender formation begins with the family in the early childhood and always continues,

since there are always factors influencing the level of one's feeling of belonging to this or that gender.

There is plenty of evidence to support the account of gender differences. It is crucial to understand the importance of these differences, since they are indeed one of the pillars that society is built on. It has been shown that boys and girls are brought up differently from the moment they are born. Why? There are different factors to be included in the answer, but one of the most significant is the fact that parents treat a baby from the very beginning of their life as if they already belonged to one or another gender. The baby's sex is assigned by default, but gender is what gets built by the attitude of the surroundings. For instance, what are these 'like mother, like daughter' rituals, and why do girls usually like having dolls in the baby stroller and pretending to be mums themselves? Simply because this is a model where a little girl is playing one of the main roles; she observes it from her mum's model, not from her dad's; however, it should be taken into account that, nowadays, the model of men's parental role, such as, for instance, the paternity leave, is becoming more and more widespread and popular. On 6 February 2020, news hit the front pages under the following heading: 'Dads win: Finland to give men the same parental leave as new Mums' (American Psychological Website; Dea and Nakagawa, 2018; Miller, 2017; Edwards, 2017). In Japan, the paternity leave is 52 weeks. In 2021, a new law came into force in Ukraine that allows fathers to take a one-time paid vacation of 14 calendar days. Both Lithuania and Hungary offer parents the opportunity to share 156 weeks of leave, meaning that it is up to the couple how they divide parental responsibilities.

There is an experiment reported by Brewer (2001) and described in the book by Fulcher and Scott *Sociology* in the chapter dedicated to the sex, gender, and sexuality (2007) that perfectly fits the topic. They say that babies in Britain are commonly dressed in different colours, blue for a boy and pink for a girl (quite common for the Western European culture as well). This may seem a trivial

observation, but these differences in clothing elicit powerful differentiating responses from adults. So, in the abovementioned experiment, the same baby was first dressed in pink and then in blue. Adults immediately assumed that pink meant female and blue meant male. The child was then handled and spoken to quite differently. When in pink, the baby was described as beautiful, when in blue as strong. Different futures were imagined and projected to the child's mind and understanding according to the presumed sex. Children know whether they are boys or girls as soon as they can talk. By the time children are three or four years old, they see these differences as biological and permanent. Then they begin to inhabit different worlds in which each plays only with children of its own sex and avoids contact with the other, thereby reinforcing gender divergence (Brewer, 2001). In the author's opinion, *sex* should have been changed to *gender*, since children, even when they are small, try to get where they belong to more without evaluating the variables that affect adults' decisions like opinions from the society and surroundings, relevancy, etc.

Nancy Chodorow, who describes herself as a humanistic psychoanalytic sociologist and psychoanalytic feminist, argued in 1978 that all infants had a close attachment to their mothers. Because mothers have the main responsibility for childrearing, children tend to identify with them (Fulcher and Scott, 2011). Soon, nevertheless, they come to conform to the gendered expectations of their behaviour. Boys are encouraged to achieve their distinct 'masculine' identity by breaking their close attachment to their mothers and stopping 'feminine' behaviour. They acquire values of independence and achievement and find it more difficult to express their emotions in close relationships. Girls, on the other hand, are encouraged to retain a strong identification with their mothers and copy their behaviour. Through this identification, they grow up with a more emotional and sensitive outlook. Distinct masculine and feminine personalities are reinforced at school, one of the most influential

societies a person ever faces; by the mass media, at work later, etc. In her focus on early years, personality formation, and emotional relationships between parents and children, Chodorow provided an understanding of the gendering of personality and the explanation of the contrast between female sensitivity and male assertiveness. Her approach has, anyhow, been criticized for perpetuating male and female stereotypes at a time when male and female identities are changing, when men are becoming more sensitive and women more assertive. It has also been seen as a rather culture-bound theory based on the experience of a small number of middle-class, white, and two-parent families.

A knowledge of socialization processes is indispensable to an account of mechanisms that produce gender differences, but the socialization theory, according to Fulcher and Scott, faces two major problems: social change and individual choice. To understand gender, what should be taken into consideration is a balanced view which accepts human agency, but which also recognizes that this operates within the constraints of powerful socializing institutions, from the family to the mass media.

1.9. Gender stereotypes

Gender equality not only liberates women
but also men from prescribed gender stereotypes[9].
Emma Watson

Gender stereotypes are organized, consensual beliefs and opinions about the characteristics of women and men and about the purported

[9] https://twitter.com/emmawatson/status/501467746602061824?lang=en (accessed 7.12.2021).

qualities of masculinity and femininity. Gender stereotypic beliefs describe not only who women and men are, but also who they should be (Kite, 2001).

The term 'stereotyping' purports making inexcusable generalizations from sex differences and making too much of them. For instance, it is a fact that women are typically shorter than men. Whether it is equally true that some women are naturally more emotional or affectionate than men is not clear to the same extent. This may well be an inappropriate generalisation from the fact that raising children means that most women are affectionate towards their children. The exclusion of women from labour-intensive or physically challenging forms of work would be an example of too much importance being attached to actual differences between sexes. In times of necessity (such as wars, for instance) women quite adequately replaced men in all forms of manual work. This shows that labour market segregation is a product of socially constructed gender differences and not a matter of biological necessity'. The rejection of biological explanations of gender differences resulted in their explanation by reference to gender roles that specify how men and women are expected to feel, think, and behave. These prescribe not only the kinds of work that men and women are expected to do but also the feelings that they can express and everyday aspects of their behaviour, such as the way they speak and dress. The term 'sex-roles' has been widely used to express the same idea, but in the author's opinion, it should be referred to as 'gender roles' since the behaviour of men and women is assumed to be shaped by beliefs about gender. Gender stereotypes, in other words, are shared views of personality traits often tied to one's gender, such as instrumentality in men and expressiveness in women. Men are seen as analytic and good at problem solving, whereas women are seen as creative and verbally skilled. Gender-associated role behaviours, physical characteristics, and cognitive abilities documented by Spence, Helmreich, Cejka, Eagly and others are presented in Appendix 7 and Appendix 8 (Helmreich and Spence, 1979).

1.10. Gender and self-perception

Next time you are about to call a little girl 'bossy', say instead: she has executive leadership skills[10].
Sheryl Sandberg

As for this work and understanding of gender here, the interest lies in self-assessment and in how it differs depending on gender. According to the book by Richard Ducker *Elaboration and Student Engagement in Design Education*, gender differences have been found in self-assessment. In 2003, Professor Rees from Cardiff University found that 72.7% of females of first-year medical studies underestimated their performance, while 73.3% of males overestimated themselves. Another study of medical students done by Lind et al. in 2002 showed that males are found to overestimate and females to underestimate their performances. In reality, though, female students were statistically outperforming their peers. Both aforementioned studies are in line with Das, who researched the issue in 1998 and found gender a highly significant variable in negative self-evaluation of problem-based learning amongst women.

A new study by *the New York Times* authors, Joseph Grenny and David Maxfield affirmed that gender bias in the workplace is real, exploring that women's anticipated competency falls by 35% and their perceived worth drops by $15,088 when they are judged as being 'forceful' or 'assertive'. Correlate this with the falls in competency and worth that men experience when being judged as forceful: their competency falls by 22% and their worth drops by $6,547. This compelling contrast affirms a bona fide gender bias that blocks

[10] Sandberg, S., 2010 December. Why we have too few women leaders. TEDWomen, https://www.ted.com/talks/sheryl_sandberg_why_we_have_too_few_women_leaders?language=en (accessed 8.12.2021).

women from succeeding entirely in leadership and management roles where assertiveness is, surely, a crucial behaviour. The experiment was conducted in the following way: respondents were asked to watch a video of a woman-manager speak up in a way that is forceful and assertive. They also received the same video of a man-manager speaking. Grenny and Maxfield showed videos to more than 11,000 subjects. Many observers judged this woman as incompetent, and a poor leader. But when a man did the same, he was not judged as harshly as the woman. Past studies (Brescoll, 2008) have shown that both men and women judge women more harshly for expressing the same degree of passion. It is considered to be the hardest kind of sexism to address, since it is not overt, it is covert (Grenny and Maxfield, 2015).

In this paper, an assessment of one's knowledge will be the crucial object of observing. As it is said in the paper: 'Self-assessment differences between genders in a low-stakes objective structured clinical examination' (Madrazo, Lee, McConnell, and Khamisa, 2018), accurate self-assessment – the ability to assess one's own performance globally – is critical to lifelong learning as it allows medical students and physicians to appropriately set goals while identifying strengths and weaknesses. Self-assessment is often measured by the relationship between self-assigned scores and those provided by objective observers where a larger difference in these scores denotes poorer accuracy of self-assessment. This study demonstrates that underestimation among females is observable even in a low stake setting. Surely, a knowledge assessment is something different, but it is assumed that the results of the experiment are about to be similar.

Indeed, there are many studies that aim to check what both men and women think about the matter of areas where men are better than women or vice versa. For example, the work *Examining Gender Differences in Written Assessment Tasks in Biology: a Case Study of Evolutionary Explanations* by Federer, Nehm, and Pearl states that women have an advantage in issues like Constructed Response (CR) because of excellent oral skills. And men, as a rule,

exhibit riskier behaviour on objects such as Multiple Choice (MC) and when generalizing to unfamiliar objects.

It is highlighted that in this work, the object (the illusion of explanatory depth described in the next part) is analysed from a gender perspective, and the main pillar of the hypothesis is gender: the assessment of one's knowledge from a gender affiliation.

Chapter 2

The perception of own capabilities vs. reality

2.1. The illusion of explanatory depth

The greatest enemy of knowledge is not ignorance –
it is the illusion of knowledge[11].
Daniel Boorstin

A book by Steven Sloman and Philip Fernbach *The Knowledge Illusion* has become a basis for this part. It was described as 'the newest guide on the mechanisms of human intelligence' by *Psychology Today* and became the crucial pillar for the author's understanding of what the illusion of explanatory depth is.

The illusion of explanatory depth is an assumption that one perfectly understands cause and effect relationships, while, as a matter of fact, it is far from the case. Rozenblit and Keil, both Yale psychologists, first studied and coined this term back in 2002 with the study *The Misunderstood Limits of Folk Science: An Illusion of Explanatory Depth*. According to them, the illusion of explanatory depth is the incorrectly held belief that one understands the world on a deeper level than one actually does.

Among other things, such as tests to prove that this is the case, they outlined four factors that contribute to this illusion of explanatory depth. The first one is to change blindness. This is a phenomenon that can be explained by the example of a bicycle. A person knows what a bike looks like, but if they close their eyes and are asked to picture a bike, the picture will be different from what the actual object

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[11] Krucoff, C., 1984 January 19. The 6 O'clock Scholar: Librarian of Congress Daniel Boorstin and His Love Affair with Books. *The Washington Post*.

looks like. Phil Fernbach, a researcher with a doctorate in cognitive science and the co-author of *The Knowledge Illusion*, conducted an experiment on this matter. He brought people into the lab, gave them a simple test, saying: 'Just draw in where the pedals go, draw in where the chain goes and draw in where the frame goes'. The results he got were pictures of what bikes had not looked like since the 1920s, or pictures of metal elements with two wheels. He did not cherry-pick these examples, and these are good representations of the average level of knowledge of things we use every day. This is so-called blindness to the makeup of the bike and blindness to that fact by the person who is blind to the makeup of the bike (live speech for TED talks 2013). Examples of the pictures are presented in Appendix 9.

The second factor is confusion with layers of explanations. It is going to be explained by the example of a mobile phone. How should the mobile phone be explained? A common answer is expected to be, among other things, mentioning that there is a touch screen, a battery, a speaker, emojis, camera, etc. Then comes a question about what the camera is – the answer is assumed to be connected to a lens, a flash, an aperture etc. What has just been shown is delving into two different layers of the analysis of the phone. The first layer is the stuff that makes up the phone, and the second layer is the stuff that makes up that stuff, and so on, if it continues. A problem arises when a surface layer understanding of something is gained but thinking that all the layers are known creates the illusion of explanatory depth. There are deeper level questions that might not be answered, but because the first layer is known, a person's brain might think: 'Yes, I know the answer'.

The third factor is the murkiness of knowledge. This one builds on the previous point. The keyword in the illusion of explanatory depth is 'explanatory' since this illusion only works with explanatory knowledge, not with facts or processes or other kinds of knowledge. Explanations generally, if not always, have no explicit conclusion

because there are so many layers of explanation that one can go into, and, therefore, it is not obvious whether one knows it or not.

Moving on to the fourth factor, it is the rarity of explanations. Explanations are much rarer than stating the fact or talking about a process. People do not often explain how toilets, bikes, or refrigerators work, and that is because it is not needed. Thus, people have less familiarity with explanations, which makes them more susceptible to overestimating their own knowledge. While each of these four characteristics may be present to some extent with other kinds of knowledge, such as facts or procedures, it is claimed that they congregate most strongly with explanations and interpretations, generating a powerful illusion of knowing (Rozenblit and Keil, 2002). One of the most important takeaways of the illusion of explanatory depth lies in the fact that recognition does not equal understanding. For instance, someone can know that this something is a computer, but that does not necessarily mean that they know how it works.

An illusion is a product of intuitive consciousness. People tend to automatically and effortlessly imagine this or that object or situation. The next question is whether people are more inclined to intuitiveness or deliberation. This was checked by a marketing professor at Yale University, psychologist Shane Frederick, who offered a simple test which allows the determination what type of thinking a person is more inclined to. He called it the Cognitive Reflection Test, which consists of three simple problems, one of which Shane took from a puzzle collection: 'A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?' Let it be assumed the reader of this paper does not realize that there is a catch in the riddle, is not too versed in psychology or behavioural economics, and mechanically relies on intuition, which quickly prompts them the answer to the question. The answer is likely to be 10 cents: almost everyone answers in this way, including the majority of Ivy League students, and the vast majority of people who the author of this paper asked. Even very

well-educated people made mistakes. Only 48% of Massachusetts Institute of Technology students sampled were able to answer all the questions correctly. The deeper and more crucial question, in fact, is whether one should believe the hint of intuition or still check it. People usually tend to ask the second question (or not ask it at all) after they give an answer, choosing the first option by default and relying on intuition. But after checking this simple task and giving it a little more time, the following result appears: if the ball costs 10 cents, and a bat costs $1 more, then together they should cost $1.2. So, the answer 10 is wrong. Few people try to check their intuitive answers and understand this. However, as for those who are trying – almost everyone may find the right answer – 5 cents. These people usually have an analytical mindset: such people tend to suppress intuitive reactions and make decisions on the basis of the reflection. In addition to the bat and ball problem, the CRT test includes two more, which are presented in the Appendix 10 (Shane, 2005). In a survey of 3,428 people, an astonishing 33% gave wrong answers to all three questions. Most people – 83% – got at least one of the questions wrong.

The common feature of all these three CRT problems is that a direct answer immediately comes to mind. To get the right answer, the intuitive report must be blocked and simple calculations have to be performed. But most people do not do either. People usually unconsciously rely on intuition and give the answer that first comes to mind, instead of sweeping it aside, thinking a little and finding the right one.

According to the results of the test on a larger sample, fewer than 20% of respondents gave the correct answers to all three CRT test problems. Mathematicians and engineers do better than poets and artists, but the difference is not big. In the tests conducted by Federic, about 48% of the Massachusetts Institute of Technology (information technology, economics, physics, chemistry and mathematics) and only 25% of Princeton (areas of the natural,

liberal, social and technical sciences) gave the correct answers to all the three problems. Another important aspect of this test is the secrecy of the goal, since knowing the aim, respondents tend to be more likely to think about the riddle right away, assuming there is a catch, and not to give a quick first answer that comes to mind as they are used to.

People who are more thoughtful are usually more circumspect when it comes to issues that need some reflection. They are also more risk-averse, less impulsive, and generally more likely to take risks or wait longer if this can lead to better outcomes. There are many non-economic or risk-averse factors indicating differences in the preferences of people of the first and second types. For example, more thoughtful people, unlike less thoughtful people, prefer dark chocolate to milk chocolate and are less likely to believe in God (Steinberg, 2008).

Getting back to the illusion of explanatory depth, it is less pronounced for people with thoughtful inclinations (and better CRT test scores) than for people with a less analytical mindset (Fernbach and Sloman, 2017). In 2017, professors Fernbach and Sloman conducted an experiment to investigate this issue. This experiment served to be one of the main pillars of the experiment conducted by the author of this paper. In their experiment, they asked participants to evaluate the level of their understanding of the mechanisms of operation of not quite ordinary consumer goods. In their case, the subject of the survey was the Aqua Globes system designed for automatic watering of indoor plants. The respondents were asked twice: before and after the authors explained the purpose of this product. The results of the experiment showed the following results: participants who successfully passed the CRT test had little or no illusion of explanatory depth. As for the opposite of these participants: those who gave no more than one correct answer during the CRT testing had a notable level of illusion of explanatory depth. In other words, for more thoughtful participants

with a successful CRT test, the level of understanding of the question before and after the presentation of explanations was approximately the same, while participants with less analytical thinking more often expressed doubts about their initial assessments after getting to know the explanations. It is important to emphasize the fact that people with more analytical thinking do not always understand the work of the mechanisms of automatic watering colours better; they only have a more realistic view of their knowledge .

Intuition offers people a very rough and simplified, however still fair and tolerable appraisal of the situation. This is what strikes the illusionary sense of the sufficiency of knowledge. At the same time, if a person forces themselves to think a moment longer, it becomes obvious how much more complicated the world is and how little people know indeed.

But the question is why this is happening, and those who pass the CRT test successfully do not have the illusion of explanatory depth. Searching for an answer to this question, Fernbach and Sloman (2017) conducted another experiment. They created a selection of promotional materials for products with differences in the number of details in the description of each product. The advertisements were shown to the experiment participants, after which they were asked to answer how much they liked each of those products. The outcome of the experiment was the following: more thoughtful participants preferred products with a more detailed description; the choice made by people less inclined to think reflectively was different. It is worth noting that, according to the book, most people belong to the second type. Participants with less successful CRT results preferred products with short descriptions and the abundance of details only annoyed them. People of the first type, with a high level of reflective thinking, tend to explain everything, so it is natural to assume that they begin to seek explanations even before they are asked about them. Hardly any of these people are affected – whether strongly or to a lesser degree – by the illusion of explanatory depth.

The basics of understanding the illusion of explanatory depth itself, where it comes from, why and how have also been also described by Fernbach and Sloman. Everyone has their own intuitive perception: in the process of reflection, a person uses information known to themselves; information that they vaguely suggest that they know, or know very superficially; information known to other people. This is also one of the foundations of behavioural economics: each person has their own individual background on which all their actions are based, and which consists of different variables. For better understanding, an example of election voting is taken. The choice of many people is based not on their personal knowledge, but on the lack of information and knowledge about other people, opinion leaders, the media, etc. When a person reflects on which candidate to vote for, they may well turn for advice to another person whom they respect.

In this case, the result of the former person's thought process depends on the community of knowledge holders. Thus, one of the reasons for the emergence of the illusion of explanatory depth is that the intuitive system, roughly speaking, overestimates its analytical abilities. Behavioural economists believe that people are susceptible to irrelevant influences from their immediate environment (which is called context effects): irrelevant emotions, short-sightedness, and other forms of irrationality (Ariely, 2008).

If there is a question about how the toilet works, most people will immediately answer: 'Yes, i do know how it works, it's just a toilet'. But if the question of how the toilet works becomes exposed to be reflected and thinking over, most people are getting confused. Because the actual intuitive understanding of the toilet is very superficial unless the respondent is a plumber or has a grasp of engineering.

The illusion of explanatory depth is, in other words, when people inaccurately overestimate their knowledge about a certain thing. This illusion can be observed everywhere since there are

lots of things which people use all the time and which they know almost nothing about, but they think they do. The previous example of toilets can be swapped and replaced with refrigerators, zip fasteners, locks, mathematics, history, art, or just general knowledge assessment. Humans lean very strongly on information that is right in front of them. As it is stated in Rozenblit and Keil's book: 'When people succeed at solving problems with devices, they may underestimate how much of their understanding lies in relations that they are apparent in the object as opposed in being mentally represented' (2002).

Can the illusion of explanatory depth indeed have quite a big impact? The answer is assumed to be: yes. There are different names used to describe the same phenomena: the illusion of understanding (Fernbach, 2014) and the illusion of knowledge (Sloman, 2017). The ideas behind these terms are the same. There are interesting facts for the purpose of this paper that were presented by Steve Sloman, one of the authors of the book *The Knowledge Illusion*. According to him, it turned out that Americans are not as knowledgeable as they think they are. As reported by a 2012 National Science Foundation survey, about 25% of Americans do not know that the Earth revolves around the Sun rather than vice versa. In 1943, only 25% of college freshmen knew that Abraham Lincoln was the President during the Civil War (Sloman, 2017). Another ridiculous example was shown during Solman's speech for the RSA, a charity which encourages the release of human potential to address the challenges that society faces. Over 80% of Americans support the idea that GMO genetically modified foods should be labelled as such because they are produced with the use of genetic engineering. This seems a perfectly reasonable thing to support, until it comes out that they also thought that foods containing DNA should have mandatory labels. It makes one wonder what the thinking process that led them to the first conclusion was, and it is also obvious with the grounds behind this issue that there are no products without any DNA in

it (survey of Department of Agricultural Economics of Oklahoma State University, 2007). Fernbach talked about a similar study of his during the Ted talks speech. They brought in a bunch of people who had different opinions on GMOs, ranging from a view that they were great, and everyone should eat them to the position that they were terrible, and no one should eat them. Participants were asked to answer this question with 'true' or 'false': a gene inserted into a food product can migrate into the genetic code of humans who consume that food. The answer is false, but what is interesting is what Fernbach found. He claimed: 'The people who are most passionate, most vociferously opposed to this, are ones who most strongly hold this false belief. Now, I am not trying to imply that everyone opposed to GMOs holds this false belief. What I implore you to do, though, is to think about it'. He also polled participants on specific political issues of current interest – matters that were fairly debatable, like a single-payer healthcare system or emission trading. Participants were then asked to explain how each of those things worked. Phil and his team found that people, even if they had extreme and passionate views on a particular issue, did not always know how that issue worked. He said: 'They think they know how these policies work, in fact, they do not. And the attempt to try to explain leads to a drastic reduction in the feeling that they get these things' (Fernbach, 2013 – live speech).

In Sloman's opinion, people suffer from the illusion of knowledge (or understanding) because we fail to distinguish what other people know from what we know. It is called knowledge conflation. As a result, when we think about the mind, instead of thinking about it as something that happens between our ears, we should think about it as something that happens within a community because we depend on each other's knowledge to a great extent (Sloman, 2017 – live speech).

There is another study Sloman did with his student that shows how knowing that other people understand things makes us feel like

we understand. In this experiment, they invented the phenomenon of glowing rocks and told people that the scientists who discovered them have not yet explained them; they do not yet understand how these glowing water rocks work. 'How well do you understand them?' was the question from the researchers. People gave the natural response 'I do not understand them at all'. Another condition considers the same circumstances, but in the second case, they said the scientists have thoroughly explained how these glowing rocks work; they fully understand how they work. 'How well do you understand how they work?' was the question to the respondents. The results were the following: primo, nobody has a great sense of understanding on this matter scaled from one to seven. In the case when scientists do not understand the phenomenon, respondents' judgments are not much higher than one. But when it comes to the second case, when scientists do understand, their judgments are almost twice as high. It turns out that respondents have a sense of understanding that they did not have before if someone else does have knowledge. There is one more example provided by Sloman during his speech for the RSA: one's sense of understanding who to vote for is based on the understanding of the people around them, and their sense of understanding is formed on the understanding of the people around them, so it turns out there is no real understanding, and we all vote based on the proverbial house of cards. Ignorance is bliss, but illusions are not (Sloman, 2017 – live speech).

A new survey conducted in March 2020 deserves attention in this paper, too. The Pew Research Center is conducting a new survey that displays the division about COVID-19 between people who primarily receive their news from social media and those who rely on more classical news sources. There were 8,914 adults surveyed in America, splitting survey participants by the main channels they use to absorb news. In the group of respondents that claim to be consuming most of their news from social media, only 37% of respondents said that they wait the COVID-19 vaccine to

be accessible in a year or more, which is an answer ranging with the ongoing scientific accord. In every other group with the omission of the local TV group, at least 50% of participants answered the question correctly. A third of social media news enjoyers also claimed that they were not convinced about the vaccine availability. Among participants who read most of the news from social media, 57% said they saw at least some information about COVID-19 that 'seemed completely fictional'. For people who read most of the news through the print media, that number was 37%. Most alarmingly, people who chiefly consume their news via social media thought the risk of COVID-19 was fabricated and hyperbolic. Of the social media news consumers among the respondents, 45% claimed that the media 'greatly exaggerated the risks' posed by the novel coronavirus. Radio news users were close behind, with 44% believing the media greatly exaggerated the threat of the virus, while only 26% of print users – those more likely to be paying for their news – believed the same. This research also shows how people tend to use the information that is easier to use, without trying to find any relevant resource. In this case, information about vaccine is completely open (Hatmacker, 2020).

'Do you know enough to hold the position that you do as strongly as you do?', said Fernbach during his Ted talks speech on the illusion of understanding. The majority of people cannot explain how the kettle works, not to mention more sophisticated issues.

Is there anything to do about this problem of relativity, illusion of knowledge and irrational decisions? Dan Ariely, Professor of behavioural economics, gave examples and explanations of these phenomena in his tremendous book *Predictably Irrational*: from drinking coffee and buying cars to choosing a romantic partner, Ariely changes the understanding of how we behave in the world. Also, there is an example from a study conducted by Amos Tversky and Daniel Kahneman, 'fathers of behavioural economics and two friends', who made an improbable contribution to the development of this field into

a full-fledged science. A study is about a person who has two errands to run. The first one is to buy a new pen, and the second one is to buy a suit for work. At an office supply store, there is a pen for $25. He is set to buy it, when he remembers that the same pen is on sale for 18$ at another store 15 minutes away. What would he do? Most people faced with this dilemma say that they would take the trip to save $7. What about the second task? He finds a luxurious pinstripe suit for $455 and decides to buy it, but then another customer whispers in his ear that the exact same suit is on sale for only $448 at another store that is just 15 minutes away. What would he do? In this case, most people say they would not buy the cheaper one (Ariely, 2008). This is the problem of relativity, and the same happens with information and knowledge, when it comes to the illusion of explanatory depth.

Richard Thaler, an American economist who was awarded the Nobel Memorial Prize in Economic Sciences for his contributions to behavioural economics, came up with the *econs*: a definition that he used a lot in his book *Misbehaving*, a book on how emotions affect economic decisions. a simple discrepancy between the economists' model of rationality and actual human behaviour, as well as many others that Thaler observed, leads him to classifying the population into *econs* and *humans*. *Econs*, according to Thaler, are economically rational people who fit the model completely. Compared to the imaginary world of *econs*, *humans* often behave 'incorrectly', not following the model, meaning that predictions based on economic models often tainted by inaccuracies. Humans may be marked out as sentimental, spontaneous, emotional, and definitely far away from being perfectly rational. *Econs* do not have excessive confidence and tend to always make the best and the most appropriate choice (in terms of rationality) among many alternatives. An *econ*, according to Thaler, is a purely theoretical model impossible in the real world, as sciences such as psychology and sociology come into play (Thaler, 2015). Here is the link between the classical understanding of economics, behavioural economics, and the illusion of explanatory

depth, which is the main object of this work. It is common for *humans* to overestimate their own capabilities because of the prism of excessive confidence or lack of sufficient knowledge, or simply because of the lack of that knowledge. It should be emphasized that this does not mean that people are ignorant: we just know less than we imagine unless we are *econs*. They do not think that they know a lot; on the contrary, they clearly understand how small their knowledge is. But as it is crystal clear from the previous parts, *econs* exist only in Ariely's paper.

So, would not economics make more sense if it were based on how people actually behaved, instead of how they should behave; if it took into account all illusions of explanatory depth, knowledge or understanding? To a great extent, standard economic and Shakespearean views are more optimistic about human nature since they assume that our, people's, reasoning abilities are boundless. By the same token, the view of behavioural economics is less rosy since it demonstrates the many ways in which people are not rational like classical economics models suppose we should be – from having more bias than any model covers, to being completely irrational when it comes to buying a bottle of wine or a self-evaluation in front of a girl or a boy we like. Indeed, it can be rather disappointing to realize that we all continually make irrational decisions in our personal, professional, and social lives. But there is a silver lining: the fact that we make mistakes, think that we know more than we actually know also means that there are ways to improve our decisions, the level of knowledge, awareness, and mindfulness (Ariely, 2008).

2.2. Overconfidence about complex phenomena

The person who says he knows what he thinks but cannot express it usually does not know what he thinks[12].
Mortimer Adler

The illusion of explanatory depth is a variant of self-confidence. Overconfidence, in turn, is an illusion that one's personal abilities, including knowledge, are better than they really are. Numerous experiments, such as studies by Fischoff, Slovic, and Lichtenstein (1977), have shown that people regularly overestimate their own knowledge. This is what the author intends to evidence and verify through the empirical research in the framework of this work.

What is the interlink with economics? Behavioural economists similarly point out that investors, for instance, tend to be overly confident in their forecasts of future trends, which leads to more trading than is rational. This affects everything and everyone, from policymakers to entrepreneurs and, especially, investors. There is an idea related to the illusion of explanatory depth, *metacognition,* driven by the question of how people assess and measure their own skills and abilities. The basic idea behind the Dunning-Kruger curve is that people with lower levels of competence tend to greatly overestimate their own skill levels (Ritholtz, 2019). In 2013, Philip Fernbach and colleagues demonstrated that the illusion of explanatory depth affects people's policy positions on issues such as single-payer health care, a national flat tax, and a cap-and-trade system for carbon emissions. Thus, the studies by Fernbach and colleagues were the following: similarly to Rozenbilt and Keil's works, people were first asked to rate how well they understood the issues, and then they were asked to define and explain how each of

[12] Adler, M. J., Van Doren C., 2011. How to Read a Book. New York: Simon and Schuster.

those issues worked and afterwards re-rate their level of understanding of each issue. Correspondingly, participants rated the extremity of their attitudes on the issues both before and after asking for an interpretation. Both self-reported understanding of the issue and attitude extremity declined significantly after the issue has been explained: people who heavily supported or opposed an issue converted to those who had a more balanced and gentler opinion. Furthermore, the decreased extremity also reduced the enthusiasm to donate money to a group advocating for the issue. These studies show the illusion of explanatory depth as a forceful tool for relaxation of bitter political discords and disagreements. Surely, the illusion of explanatory depth provides a boost, well beyond artefacts, to how people think about scientific fields, mental illnesses, economic markets and virtually anything we are capable of (mis)understanding. In any area of knowledge, often the most ignorant are the most overconfident in their understanding of that area. Justin Kruger and David Dunning properly demonstrated that the lowest performers on tests of logical reasoning, grammar, and humour were most likely to overestimate their test scores. Only through achieving competence in an area do people admit its complication and gauge their confidence appropriately. Having to define the issue compels people to appreciate this complication and grasp their bewilderment. At a time when political polarization, income inequality, and urban-rural division have genuinely fissured people over social and economic issues, identifying people's only prudent, frugal, and plain comprehension of these issues is the first step towards overcoming these divisions (Waytz, 2017).

Overconfidence is not limited to one's knowledge of the facts or our perception of one's predictive abilities. This overconfidence is also present in the perception of one's own competence and understanding of narratives and other phenomena that are beyond human scope. In experiments, students that are about to take a test in a particular subject tend to feel that they understand the material better than they actually do (Glenberg and Epstein, 1985).

Leonid Rozenblit and Frank Keil (2002) used the term of the illusion of explanatory depth to describe how in a series of experiments people systematically overestimated their understanding of complex phenomena. Researchers turned to people with specific questions to check the depth of their understanding – for instance, asked them to explain how a helicopter could switch from hovering to flying forward – and found that people who thought they understood the basics of physics and mechanics could not answer correctly. Only after hearing an expert explanation, did the participants of the experiments realize they were too self-confident and revised their initial estimates downward. It might seem that the participants initially reported a higher level of understanding than they actually had in order to avoid embarrassment, but it is considered to be unlikely, as participants reported that they did not think about the importance of such knowledge after the experiments took place.

Scientists argued that an illusion arises when people have general, superficial knowledge of some obvious patterns, and they confuse this with the understanding of the mechanics of the phenomenon. People tend to rely on visible aspects to build an understanding of how everything works, but this understanding, in the case of complex phenomena, is actually very superficial compared to the true one (Rozenblit and Keil, 2002).

The daily manifestation of the illusion of explanatory depth is that people greatly underestimate the work and knowledge associated with creating ordinary home appliances. Even simple things like a hammer and a shovel depend on factors such as relative weight and torque that go unnoticed by most people, but which are necessary for their effectiveness and reliability as a tool. Thus, most of us, if asked, tend to think of these tools as being easy to manufacture, even if they actually come from complex engineering processes or long sequences of trial and error (Tasic, 2009).

Chapter 3

Research design and methodology

Research is creating new knowledge[13].
Neil Armstrong

3.1. Purpose, aim, hypotheses and methods of the research

This paper's research attempts to answer the following question: how does gender affect the level of assessment of one's self-knowledge?

The aim of the research is to address both practical and theoretical research question: how do the phenomena of the illusion of explanatory depth on an example of self-assessment differ depending on gender socialization? An online survey is considered to be the most suitable approach for this paper since this study does not require any additional conditions, but only respondents who answer questions and a timer, which was set on each of the questionnaires. Since the study for this paper concerns the topic of gender and self-knowledge assessment, all ethical considerations have not been violated: the option of the third gender is available, there are no questions about skin colour, and information about nationality and religion is collected just for the purpose of further research on data from the experiment. This survey does not have any signs of sexism, racism, or other infringements of human dignity.

The structure of the experiment is as follows:

1. The experimenter and researcher who develops and conducts the experiment: the author of the paper.

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[13] Levine, J., 2005. A long-overdue tribute, https://www.nasa.gov/centers/dryden/news/X-Press/stories/2005/102105_Wings.html (accessed 11.12.2021).

2. The experimental factor (or an independent variable) which is a condition or system of conditions that are introduced by a sociologist: relationship between level of the illusion of explanatory depth and the respondent's gender.
3. The experimental situation, i.e. the situation that is created in accordance with the research programme for the experiment: online questionnaire.
4. The experimental object is a group of people who have agreed to participate in an experimental study: students.

3.2. Data collection method and study conduction

Data collection is an empirical activity carried out in the form of an online survey. The survey has been devised by the author based on similar questionnaires used for final testing and exams of school graduates. The survey asks respondents to fill in personal information, evaluate their knowledge in five specific fields (mathematics, geography, English language, literature and biology), and then to complete the tests on each of the abovementioned fields – seven questions for each field. The personal information part (name, education, age) is created in order to collect qualitative information to provide an option to come up with new hypotheses and continue research into this matter; these questions are in the form of a free description. The evaluation part is based on rating scale questions, where 1 is poor, and 5 is excellent. The test part, after all, is in the form of multiple-choice questions, where only one answer is correct. All the questions and the whole survey itself are presented in Appendix 11. It should be noted that two identical surveys have been prepared, in English and in Russian, both of them are analysed, but only the English version of the survey is presented. There is a visualization of how the data have been processed in Appendix 12, and Scatter plots are presented in Appendix 13.

The target group of the study comprises students aged from 18 to 25. The survey was conducted in two languages – English and Russian – to get more respondents. It was distributed through social networks among students from different countries using social media channels, such as bloggers, Lazarski University's social networks, and other universities' Facebook communities. It was observingly more difficult to reach male than female respondents as females were more willing to participate in surveys on this matter. Each respondent received a personal link from the author and, after they started, they had 15 minutes to complete the survey. All respondents were aware of the timer – it was displayed clearly at the very beginning of the survey, and they could see the timer countdown during the whole process.

For this study, the age group of students has been chosen. The aim of this is to avoid an increase in research bias as a result of interviewing people belonging to the same age and social group. Ethic groups are mainly Europeans: Poles, Ukrainians, Belarussians, and Russians. These groups were also chosen on purpose to avoid the bias of culture, mindset and other issues with a potential impact. a group of students was easily accessible due to the fact that the survey was provided in an online form. The survey was conducted during the lockdown period (spring of 2020), thus the author managed to attract the attention of students from different universities, cities and even countries.

The questionnaire itself, filled out by respondents, is divided into two parts. The first part is dedicated to the description of personal information, such as name, surname, nationality, monthly income, etc. The second part includes the evaluation of the knowledge itself and mini-questionnaires on the proposed subjects.

Within the framework of this study, the author is interested in gender and the sphere of student education, but the remaining questions in the personal information part were suggested to the respondents so that the base collected during this experiment would be suitable for subsequent studies. The personal information is an important part

of the descriptive statistics part and the material for further research and verification of other hypotheses besides the ones that are being analysed in this work: for instance, whether the level of the illusion of explanatory depth depends on monthly income or parental education.

The second part contains questions of 'How well do you think you know [one of five proposed subjects]?' and the quiz questions relating to these subjects. There is a question set for the knowledge assessment of each subject. 5 different subjects are taken with 7 questions for each of them. The subjects are the following: mathematics, biology, geography, English and literature since these 5 areas are considered to be differentiated and crucial for the general knowledge of the person from the perspective of school education. A 'student' degree means that every single respondent has finished primary and secondary education. It should be noticed that there are no advanced questions in any of the areas as all the questions have been created based on school curricula of different countries to avoid the bias of the level of education.

So as to achieve the significance of this study, all respondents were divided into four groups: females from humanities (philosophy, law, linguistics, etc.), males from humanities, females from natural/exact sciences & economics (economics, engineering, etc.), and males from natural/exact sciences & economics. There are 50 respondents in each of these sections. An equal number was chosen in order to avoid bias discrepancies due to the education that a person receives; for example, a student of the faculty of linguistics knows English better than a student of economics. Therefore, all these four groups are analysed separately.

The respondents were found through the distribution of the online form using the following channels: the author's personal social networks as well as social networks of universities. All methods used while creating and providing the research itself are described in the methodology part. The question sets are attached to the thesis.

For any possible further research, there are also such variables as nationality, family education, monthly income, and other.

Chapter 4

Results and discussion

An investment in knowledge pays the best interest[14].
Benjamin Franklin

4.1. Descriptive analysis

All respondents are divided into four groups with the aim of analysing their answers separately since it is assumed that the results of each group might differ. Within the framework of the study, it is investigated how the level of the illusion of explanatory depth differs between men and women. Yet, one of the pillars of the study is an interest in the group that underestimates and overestimates the level of knowledge the most. The results show that it was the right decision to divide men's answers into two groups depending on the field of education because the answers of the respondents from the first and second groups are contrasting. It should be mentioned again that respondents were not aware of the purpose of the survey, so their answers are not affected by any external consequences or motives.

After the responses collected from all respondents have been analysed, results showing trends of the illusion of explanatory depth are obtained. The groups are as follows: 'humanities' males, 'science' males, 'humanities' females, and 'science' females, respectively. The group that underestimates the level of knowledge most is the 'science' males. In contrast, the group that overestimates the level of knowledge the most is the 'humanities' males. It is gripping to

[14] Franklin, B., 2016. The Way to Wealth. California: Create Space Independent Publishing Platform.

observe that both extremes are males, and it shows right away that the level of self-assessment displayed by females is closer to the accurate and rational practically proven results.

44% of all respondents tend to overestimate the level of their knowledge; however, females from both groups are likely to underestimate their knowledge, while the 'humanities' males overestimate themselves by 64%.

Another interesting observation is that both the 'humanities' and 'science' females have nearly the same results. For better investigation and presentation of visible differences, each group is discussed separately. The difference between the answers to the 'How well do you think you know…' questions and the actual results obtained after the questionnaires have been passed is calculated as an overall average absolute divergence with the AVEDEV (average divergence) formula in Excel: a function that is used to analyse a number series that is passed as an argument and returns a number corresponding to the average value calculated for the deviation modules relative to the arithmetic mean for the taken series. It is therefore observed that the overall average absolute divergence for the 'humanities' males is 52%. The 'science' males showed a lower result, 47%, but it is still higher than females' illusion of explanatory depth explained with the formula. The 'humanities' females' answers, on the contrary, show only 41% of the overall average absolute divergence; whereas for the 'science' females' the result is only 39%.

A general assessment of the knowledge is higher in the 'humanities' males than in the 'humanities' females; however, it is clearly seen that the difference between the expectancy and real answers is much higher for males (52%) than for females (41%). This leads to the conclusion that females evaluate themselves more adequately and accurately. It should also be noticed that the 'humanities' females underestimate their knowledge more than others: for instance, an average answer to 'how well do you think

you know math' question is 2.96, but, at the same time, the results of their questionnaires show that the average result is 3.4.

Another observation is a vast difference between the results of the 'science' males and the 'humanities' males. In the 'humanities' males' results, all values of the overall average divergence are positive, meaning that they overestimate their knowledge in the case of every subject; this is the only group with such a result. In essence, the overestimations are 19% for mathematics, 25% for geography, 28% for literature, a high overestimation of 46% for English, and 25% for biology. For the 'science' males, at the same time, the percentages are much lower: underestimation of 10% for mathematics, 7% for geography, an immense underestimation of 38% for literature, likewise high underestimation of almost 30% for biology, and just one overestimation of 7% for English. This leads to the conclusion that the 'science' males suffer from the illusion of explanatory depth less than the 'humanities' males.

The same observations were made for females. In the 'humanities' females' results, there is an underestimation of 28% for mathematics, a small underestimation of 4% for literature, 13% for biology, and overestimation of 15% for geography, together with 28% for English. When it comes to the 'science' females, percentages are the following: underestimation of 20% for mathematics, 15% for literature, 14% for biology, and overestimation of 6% for geography, and 24% for English. It is seen that the difference between females' answers is not as high as the difference between males' answers. It is also observed that females' extremes are lower than in the case of males: minimums are 7% for males and 4% for females, while maximums are 46% for males, and just 28% for females. So, after the investigation, it is examined that males are likely to overestimate their knowledge and that the illusion of explanatory depth is more significant for males.

4.2. Hypothesis testing

All in all, when comparing the level of the overall average absolute divergence for all subjects or the illusion of explanatory depth, the following results come up: 26% for the 'science' females, 28% for the 'humanities' females, 36% for the 'science' males, and 42% for the 'humanities' males. The lowest level of the illusion of explanatory depth is detected in the 'science' females, while the biggest one in the 'humanities' males. At the same time, it should be highlighted that the difference between the results of both females' groups is less than it is for males.

The overall percentage for males is 49%, compared with the result for females of 40%, and this leads to the conclusion that the level of the illusion of explanatory depth depends on gender socialization and is higher in males than in females. This conclusion, in consequence, entitles the author to claim that the hypothesis of the paper is not rejected.

Conclusion

What a piece of work is a man! How noble in reason!
How infinite in faculty! In form and moving how express
and admirable! In action how like an angel! In apprehension
how like a God! The beauty of the world,
the paragon of animals[15].
William Shakespeare, Hamlet

The aim of the research conducted was to evaluate the relationship between gender socialization and the level of the illusion of explanatory depth. For this purpose, the author defined the pillars of gender socialization and the phenomena of the illusion of explanatory depth. The author conducted an empirical study to test the hypothesis: males suffer from the illusion of explanatory depth more than females; the difference between real knowledge and how a person accesses it is more prominent in males' answers than in those by females. The survey was conducted among four groups belonging to one social group to prevent the bias of the study.

As a result of the work, more than 60 literature sources were analysed to deepen the understanding of the broad concept of gender and the phenomenon of the illusion of explanatory depth. After the experimental work, that is, an empirical study, had been conducted, the hypothesis was not rejected.

This research aimed to identify the illusion of explanatory depth from the perspective of gender socialization. Based on the quantitative and qualitative analysis, it can be concluded that there is a correlation between gender and the level of the illusion of explanatory depth. The results indicate that females suffer from the phenomenon of the illusion of knowledge less than males. At the same time, it should be highlighted

[15] Shakespeare, W., 2018. Hamlet. Oxford: Oxford University Press, pp. 18–22.

that males' results differ significantly by the field of education: the 'science' males tend to assess their knowledge closer to its actual proven status, with less deviation from their indicative answers.

By analysing the literature on the illusion of explanatory depth and gender and conducting empirical research, this thesis shows how gender socialization can directly shape the level of the illusion of explanatory depth.

As stated in the set hypothesis, it is believed that males suffer from the illusion of explanatory depth more than females; the difference between real knowledge and how a person accesses it is more prominent in males' answers than in those provided by females. The experimented data supported the hypothesis, indicating an illusion of explanatory depth from the perspective of gender socialization.

Remarkably, the lowest level of the illusion of explanatory depth is traced in the 'science' males and the biggest in the 'humanities' males. At the same time, there is a difference between the results of the 'humanities' and 'science' males, but it is not valid for females: both the 'humanities' and 'science' respondents show results close to each other. So, according to the research, there are the following results of the illusion of explanatory depth: 39% for the 'science' females, 41% for the 'humanities' females, 47% for the 'science' males, and 52% for the 'humanities' males.

The level of the illusion of explanatory depth displayed by males is 49%, compared to that of females at 40%. This is the result that evinces the right not to reject the hypothesis. It was empirically proven that the level of the illusion of explanatory depth depends on gender socialization and is higher in males than in females.

One of the paper's ideas was to study the concepts of gender and also to check the impact of gender socialization on the level of the illusion of explanatory depth. This idea was implemented within a few dozen pages of this paper.

Speaking of the illusion of explanatory depth, it is, beyond any doubt, a field that is worth further research since it is a voluminous and

exciting phenomenon related to sociology, behavioural economics, and, in fact, any sciences that study how people think. This work, as can be expected, will only increase interest in this field of research.

It should also be stated that after in-depth theoretical research has been conducted, it becomes evident that the reality of gender is very much different from what it used to be even twenty years ago. Androgynous people are a new fashion; dads on maternity leaves are a new trend. The importance of sex education is being highlighted and discussed with students all around the world, but there is still not too much attention or focus on gender issues.

Either way, the rigid framework of male and female behaviour is not a perfect model. It cannot be considered as complete freedom if a person is driven into any pattern of behaviour, especially nowadays. Within the framework of this work, the differences between men and women are clarified, but it should be noted that the author believes that these differences or belonging to one gender or another should not be decisive when it comes to the right to choose or any other rights. In current modernity, the stereotype of black and white opinion (or pink and blue) keeps disappearing; there are many more colours now. And it is not about the third gender or same-sex marriage; it is about the awareness and integrity of human development, regardless of gender, nationality, or any other common signs. At the same time, one can hardly argue against nature, and in most cases, it is a win-win strategy when the strengths of both genders are taken into account. It is also a global advantage when understanding and using these very characteristics of women and men lead to an increase in the overall level of the utility functions.

The results obtained allow a conclusion to be derived that men experience the illusion of explanatory depth more than women. However, it should be noticed that there are still other variables that are not considered within the framework of this study but could have an essential impact on the level of the illusion of explanatory

depth of the person. It is considered that this study may become a basis for further examinations and new hypotheses.

To conclude, it is worth mentioning that the paper covers the aims which it set at the beginning: to investigate the theoretical foundations of the concepts of the illusion of explanatory depth and gender socialization, to substantiate the relationship between them through the collection and analysis of the database obtained from the experiment, to identify prevailing trends, to create a database. Another objective was to show that the illusion of explanatory depth, understanding, or knowledge attests to another extensive difference between males and females. The author considers this paper to have achieved its objectives, outlined the issues worth attention, as well as built the foundation for potential studies.

Achieving gender equality is one of the goals of our time, but who said that this would lead humanity to happiness? It is crucial to understand that equality in the legal sense (the ability to vote, obtain education and have equal civil rights with men) and equality in social meaning are not the same concerns. Gender equality is, in the author's opinion, when a woman always has the right to 'choose', just like any man does. Gender is a whole complex of attitudes and patterns of behaviour that lead to the formation of a typically masculine or typically feminine pattern of interaction in society, family, with children, and so on. In the modern world, many people confuse the concepts of 'women's freedom' because of another concept raised in this dissertation: the illusion of explanatory depth. Currently, there are some natural 'rules' that cannot be argued because of the physiological differences: men and women will never be the same physiologically, because of the ability of one and inability of the other to give birth to a baby. We are more similar than alike, and this is what makes the world balanced, and we have a chance to take advantage only, creating our win-win strategy, so two from a male plus two from a female can become five together.

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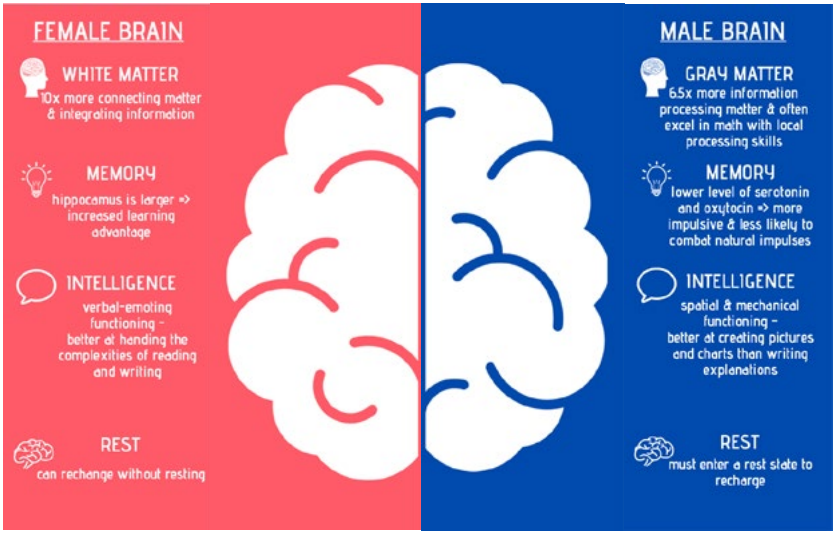
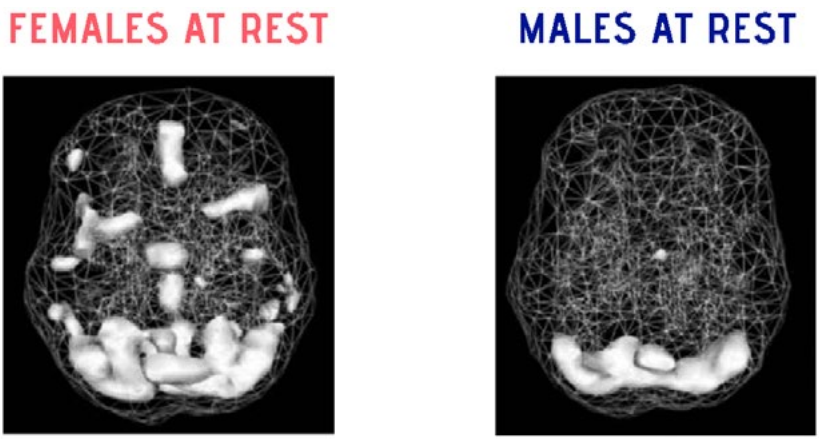
Appendixes

Appendix 1. Gender differences in the human brain



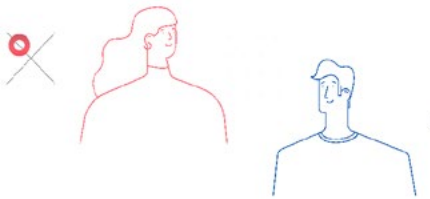
Source: author's own elaboration based on Zaidi, Z., 2010. Gender differences in human brain: a review. *The Open Anatomy Journal*, 2, pp. 38–55.

Appendix 2. Male and female brains at rest



Source: author's own elaboration based on brain scans by Amen, D., 2004. Images of Human Behavior: A Brain SPECT Atlas. Texas: Mindworks Press.

Appendix 3. Bem Sex–Role Inventory

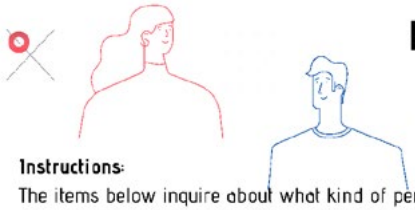


BEM SEX ROLE INVENTORY

MASCULINITY	FEMININITY	NO-TYPED
1 - Self-reliant	2 - Yielding	23 - Helpful
4 - Defends own beliefs	5 - Cheerful	6 - Moody
7 - Independent	8 - Shy	9 - Conscientious
10 - Athletic	11 - Affectionate	12 - theatrical
13 - Assertive	14 - Not susceptible to flattery	15 - Happy
16 - Strong personality	17 - Loyal	18 - Unpredictable
19 - Forceful	20 - Feminine	21 - Reliable
22 - Analytical	23 - Sympathetic	24 - Jealous
25 - Leadership ability	26 - Sensitive to others' needs	27 - Truthful
28 - Willing to take risks	29 - Understanding	30 - Secretive
31 - Makes decisions easily	31 - Compassionate	33 - Sincere
34 - Self-sufficient	35 - Eager to soothe hurt feelings	36 - Conceited
37 - Dominant	38 - Soft-spoken	39 - Likeable
40 - Masculine	41 - Warm	42 - Solemn
43 - Willing to take a stand	44 - Tender	45 - Friendly
46 - Agressive	47 - Gullible	51 - Adaptable
49 - Acts as a leader	50 - Childlike	54 - Unsystematic
52 - Individualistic	53 - Does not use harsh language	57 - Tactful
55 - Competitive	56 - Loves children	60 - Conventional
58 - Ambitious	59 - Gentle	

Source: author's own elaboration based on Oswald, P., 2004. An examination of the current usefulness of the Bem Sex-Role Inventory. *Psychological Reports*, 94, pp. 1331–1336.

Appendix 4. Personal attributes questionnaire



PERSONAL ATTRIBUTES QUESTIONNAIRE

Instructions:

The items below inquire about what kind of person you think you are. Each item consists of a PAIR of characteristics, with the letters A-E in between. For example,

Not at all artistic A.....B.....C.....D.....E Very artistic

Each pair describes contradictory characteristics - that is, you cannot be both at the same time, such as very artistic and not at all artistic.

The letters form a scale between the two extremes. You are to chose a letter which describes where YOU fall on the scale. For example, if you think that you have no artistic ability, you would choose A. If you think that you are pretty good, you might choose D. If you are only medium, you might choose C, and so forth.

M-F	1. Not at all agressive	A.....B.....C.....D.....E	Very agressive*
M	2. Not at all independent	A.....B.....C.....D.....E	Very independent*
F	3. Not at all emotional	A.....B.....C.....D.....E	Very emotional*
M-F	4. Very submissive	A.....B.....C.....D.....E	Very dominant*
M-F	5. Not at all escitable in a major crisus	A.....B.....C.....D.....E	Very excitable in a major crisis*
M	6. Very passive	A.....B.....C.....D.....E	Very active*
F	7. Not at all able to debote self completely to others	A.....B.....C.....D.....E	Able to devote self completely to others*
F	8. Very rough	A.....B.....C.....D.....E	Very gentle*
F	9. Not at all helpful to others	A.....B.....C.....D.....E	Very achelpful to others*
M	10. Not at all competitive	A.....B.....C.....D.....E	Very competitive*
M-F	11. Very home oriented	A.....B.....C.....D.....E	Very worldly*
F	12. Not at all kind	A.....B.....C.....D.....E	Very kind*
F	13. Independent to others' approval*	A.....B.....C.....D.....E	Highly needful of others' approval*

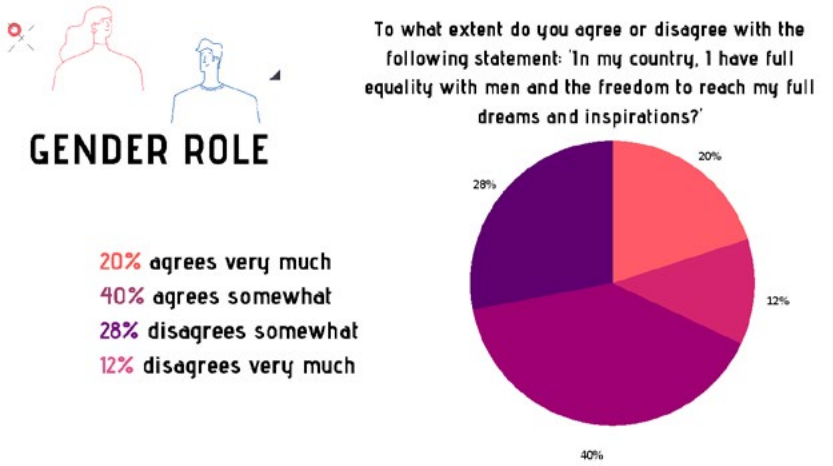
M-F	14. Feelings not easily hurt	A.....B.....C.....D.....E	Feelings easily hurt*
F	15. Not at all aware of feelings of others	A.....B.....C.....D.....E	Very aware of feelings of others*
M	16. Can make decisions easily*	A.....B.....C.....D.....E	Has difficulty making decisions
M	17. Gives up very easily.	A.....B.....C.....D.....E	Never gives up easily*
M-F	18. Never cries*	A.....B.....C.....D.....E	Cries very easily
M	19. Not at all self-confident	A.....B.....C.....D.....E	Very self-confident*
M.	20. Feels very inferior.	A.....B.....C.....D.....E	Feels very superior*
F	21. Not at all understanding of others	A.....B.....C.....D.....E.	Very understanding of others*
F	22. Very cold in relations with others	A.....B.....C.....D.....E	Very warm in relations with others*
M-F	23. Very little need for security	A.....B.....C.....D.....E	Very strong need for security
M	24. Goes to pieces under pressure	A.....B.....C.....D.....E	Stands up well under pressure*

The scale to which each item is assigned is indicated by **M (Masculinity), F (Femininity)** and **M- F (Masculinity-Femininity)**.

Items with an asterisk indicate the extreme masculine response for the M and M-F scales and the extreme feminine response for the F scale. Each extreme masculine response on the M and M-F scales and the extreme feminine response on the F scale are scored 4, the next most extreme scored 3, etc.

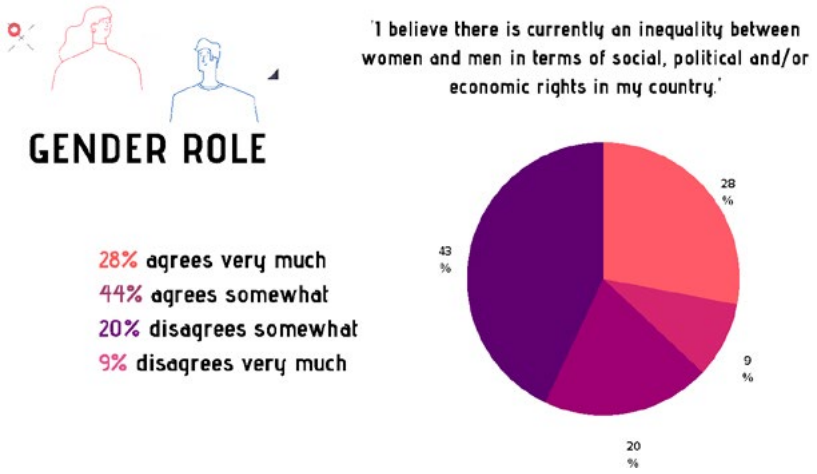
Source: author's own elaboration based on Spence, J.T., Helmreich, R.L., 1979. Comparison of Masculine and Feminine Personality Attributes and Sex-Role Attitudes Across Age Groups. *Developmental Psychology*, 15(5), pp. 583–584.

Appendix 5. Gender role: a full equality



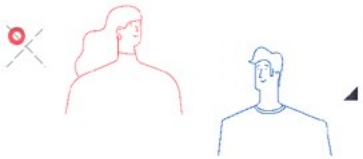
Source: made by the author based on data from Ipsos, 2017.

Appendix 6. Gender role: a current inequality



Source: author's own elaboration based on data from Ipsos, 2017.

Appendix 7. Gender stereotypic characteristics associated with men



GENDER STEREOTYPIC CHARACTERISTIS ASSOCIATED WITH MEN

TRAITS

Active
Can make decisions easily
Competitive
Feels superior
Independent
Never gives up easily
Self-confident
Stands up well under pressure

ROLES

Assumes financial obligations
Head oh household
Financial provider
Leader
Responsible for household repairs
Takes initiative in sexual relations

PHYSICAL CHARACTERISTICS

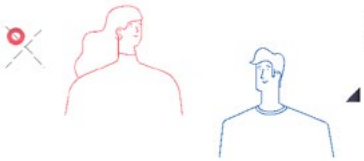
Athletic
Brawny
Broad-shouldered
Burly
Muscular
Physically strong
Physically vigorous
Rugged
Tall

COGNITIVE ABILITIES

Analytical
Exact
Good at abstractions
Good at numbers
Good at problem solving
Good with reasoning
Mathematical
Quantitatively skilled

Source: author's own elaboration based on Helmreich, R., Spence, J.T., 1987. Masculinity and femininity: their psychological dimensions, correlates, and antecedents. Texas: University of Texas Press.

Appendix 8. Gender stereotypic characteristics associated with women



GENDER STEREOTYPIC CHARACTERISTIS

ASSOCIATED WITH WOMEN

TRAITS

Able to devote self to others
Aware of others feelings
Emotional
Helpful to others
Gentle
Kind
Understanding
Warm

ROLES

Cooks the meals
Does the household shopping
Does laundry
Is fashion conscious
Source of emotional support
Takes care of children
Tends the house

PHYSICAL CHARACTERISTICS

Beautiful
Cute
Dainty
Gorgeous
Graceful
Petite
Pretty
Sexy
Soft voice

COGNITIVE ABILITIES

Artistic
Creative
Expressive
Imaginative
Intuitive
Perceptive
Tasteful
Verbally skilled

Source: author's own elaboration based on Helmreich, R., Spence, J.T., 1987. Masculinity and femininity: their psychological dimensions, correlates, and antecedents. Texas: University of Texas Press.

Appendix 9. Illusion of explanatory depth

BLIND TO THE MAKEUP OF THE BIKE
& BLIND TO THE FACT PERSON IS
BLIND TO MAKEUP OF THE BIKE

TASK:
JUST DRAW IN WHERE THE PEDALS GO, DRAW IN THERE THE
CHAIN GOES AND DRAW IN WHERE THE FRAME GOES

RESULTS:

(A) MALE

(B) FEMALE

(C) FEMALE

(D) MALE

DRAWINGS SHOW PEDAL AND CHAIN ERRORS IN (A) AND (B), FRAME AND CHAIN ERRORS IN (C), AND THE RARE TRIPLE COMBINATION OF FRAME, PEDAL, AND CHAIN ERRORS IN (D). THE FOUR PARTICIPANTS STATED THAT THEY (A) CYCLED AT LEAST ONCE IN A MOUTH, (B) NEVER CYCLED, (C) CYCLED MOST DAYS, AND (D) RARELY CYCLED.

Source: author's own elaboration based on Fernbach, P., Sloman, S., 2017. The knowledge illusion: why we never think alone. New York: Riverhead Books.

Appendix 10. Cognitive reflection test

COGNITIVE REFLECTION TEST

IN A SURVEY OF 3,428 PEOPLE, AN ASTONISHING 33 PERCENT MISSED ALL THREE QUESTIONS.

MOST PEOPLE – 83 PERCENT – MISSED AT LEAST ONE OF THE QUESTIONS.

(1) A BAT AND A BALL COST $1.10 IN TOTAL. THE BAT COSTS $1.00 MORE THAN THE BALL. HOW MUCH DOES THE BALL COST? _____ CENTS

5 CENTS (NOT 10)

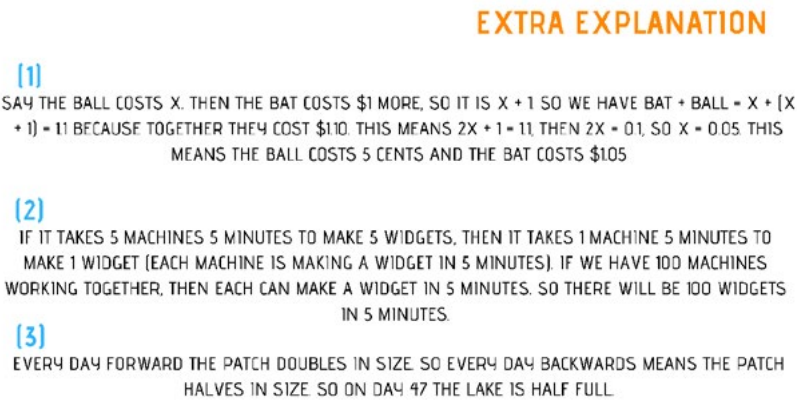
(2) IF IT TAKES 5 MACHINES 5 MINUTES TO MAKE 5 WIDGETS, HOW LONG WOULD IT TAKE 100 MACHINES TO MAKE 100 WIDGETS? _____ MINUTES

5 MINUTES (NOT 100)

(3) IN A LAKE, THERE IS A PATCH OF LILY PADS. EVERY DAY, THE PATCH DOUBLES IN SIZE. IF IT TAKES 48 DAYS FOR THE PATCH TO COVER THE ENTIRE LAKE, HOW LONG WOULD IT TAKE FOR THE PATCH TO COVER HALF OF THE LAKE?

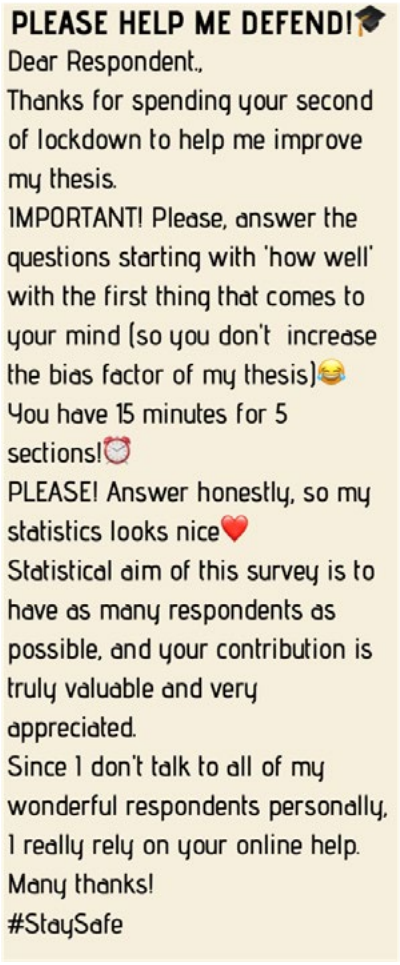
_____ DAYS

47 DAYS (NOT 24)



Source: author's own elaboration based on Frederick, S., 2005. Cognitive reflection and decision making. *Journal of Economic Perspectives*, 4(19), pp. 25–42.

Appendix 11. Survey



PLEASE HELP ME DEFEND!🎓

Dear Respondent.,

Thanks for spending your second of lockdown to help me improve my thesis.

IMPORTANT! Please, answer the questions starting with 'how well' with the first thing that comes to your mind (so you don't increase the bias factor of my thesis)😂

You have 15 minutes for 5 sections!⏰

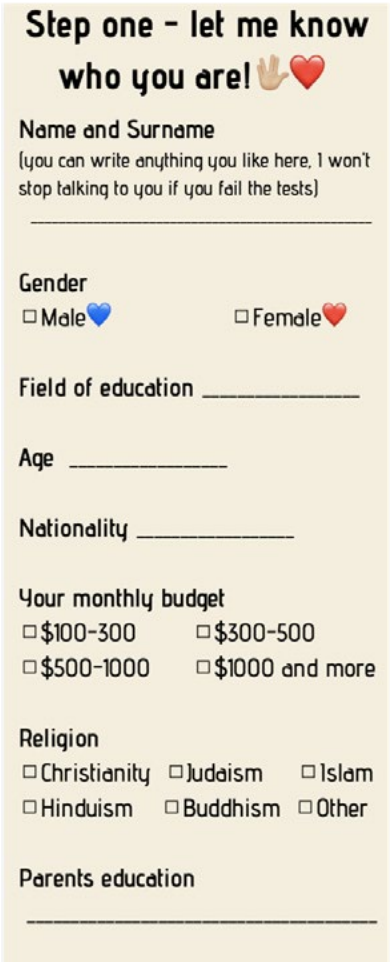
PLEASE! Answer honestly, so my statistics looks nice❤️

Statistical aim of this survey is to have as many respondents as possible, and your contribution is truly valuable and very appreciated.

Since I don't talk to all of my wonderful respondents personally, I really rely on your online help.

Many thanks!

#StaySafe



Step one - let me know who you are!🖐🏼❤️

Name and Surname

(you can write anything you like here, I won't stop talking to you if you fail the tests)

_____

Gender

☐ Male💙 ☐ Female❤️

Field of education _____

Age _____

Nationality _____

Your monthly budget

☐ $100-300 ☐ $300-500

☐ $500-1000 ☐ $1000 and more

Religion

☐ Christianity ☐ Judaism ☐ Islam

☐ Hinduism ☐ Buddhism ☐ Other

Parents education

_____

Step two - assess your knowledge!🤓📈

Assess your knowledge on the scale from 1 to 5 (where 1 is the minimum and 5 is the maximum).
IMPORTANT! Please, answer the questions with the first things that comes to your mind. Thanks!❤️

In your opinion, how good is your knowledge of Mathematics?
poor 1 2 3 4 5 excellent

In your opinion, how good is your knowledge of Geography?
poor 1 2 3 4 5 excellent

In your opinion, how good is your knowledge of World Literature?
poor 1 2 3 4 5 excellent

In your opinion, how good is your knowledge of English?
poor 1 2 3 4 5 excellent

In your opinion, how good is your knowledge of Biology?
poor 1 2 3 4 5 excellent

Step three - time for a quiz! Math📐

1. $-(m - 3.8) + (4.8 + m) =$
☐1 ☐$-2m + 8.6$ ☐$2m + 8.6$ ☐8.6

2. $19 \times 19 =$
☐271 ☐361 ☐256 ☐381

3. $9 - 9 \div 9 + 9 - 9 \div 9 =$
☐16 ☐0 ☐9 ☐18

4. Find the value of x; if $x = (2 \times 3) + 11$
☐55 ☐192 ☐17 ☐66

5. 25% from 1000 =
☐500 ☐200 ☐250 ☐400

6. Two angles of triangle are 15° and 85°. What is the third angle?
☐50° ☐55° ☐80° ☐90°

7. Sarah is twice as old as her youngest brother. If the difference between their ages is 15 years, how old is her youngest brother?
☐15 ☐20 ☐25 ☐30

Geography!

1. How many continents are in the world?

☐4 ☐5 ☐6 ☐7

2. Which of these countries is the smallest?

☐Russia ☐China
☐Ukraine ☐Canada

3. Where is the Mount Everest?

☐Kenya ☐Alps ☐India
☐Border between Nepal and China

4. What is the capital of Ireland?

☐Helsinki ☐Oslo
☐Dublin ☐London

5. What causes earthquakes?

☐Rain
☐Too many people jumping at the same time
☐Different parts of the Earth's crust moving around
☐The Sun comes too close to the Earth

6. How many countries are in the world?

☐Exactly 201
☐92
☐Between 193 and 301, depends on how you count them
☐252

7. What is the name of the longest river in the world?

☐Amazon ☐Nile
☐Yangtze ☐Thames

Literature!

1. Who is an author of Crime and Punishment?

☐Mikhail Bulgakov
☐Fyodor Dostoyevsky
☐Leo Tolstoy
☐Aleksandr Pushkin

2. What's the name of the third book from the Harry Potter saga?

☐HP and the Philosopher's Stone
☐HP and the Prisoner of Azkaban
☐HP and the Chamber of Secrets
☐HP and the Goblet of Fire

3. What is the name of the landlord of Baker Street 221B, home of Sherlock Holmes?

- ☐ Mrs Wanderwood
- ☐ Mrs Hooper
- ☐ Mrs Hudson
- ☐ Mrs Watson

4. Who is the author of Snow White, Rapunzel, and Hansel and Gretel?

- ☐ Brothers Grimm
- ☐ William Shakespeare
- ☐ John Green
- ☐ Artur Conan Doyle

5. Where from was Jules Verne, an author of 'Around the World in 80 Days'and Twenty Thousand Leagues Under the Sea'?

- ☐ Germany ☐ France
- ☐ England ☐ USA

6. Why could not Romeo and Juliet be together?

- ☐ Romeo was ill
- ☐ There was a war
- ☐ Their families did not allow them
- ☐ Juliet was married

7. Read the following poem and answer: speaker imagines a time in the future when he might...

- ☐ No longer be in love
- ☐ No longer be loved
- ☐ Be able to explain why he is in love
- ☐ Be even more deeply in love

Line	
	Against that time (if ever that time come)
	When I shall see thee frown on my defects,
	When as thy love hath cast his utmost sum,
	Called to that audit by advised respects—
5	Against that time when thou shalt strangely pass,
	And scarcely greet me with that sun, thine eye,
	When love, converted from the thing it was,
	Shall reasons find of settled gravity—
	Against that time do I ensconce me here
10	Within the knowledge of mine own desert,
	And this my hand against myself uprear,
	To guard the lawful reasons on thy part.
	To leave poor me thou has the strength of laws,
	Since why to love I can allege no cause.
15	(1609)

English!

1. Choose the best option to complete the conversation. 'Can I park here?'

- ☐ -Sorry, I did that.
- ☐ -It's the same place'.
- ☐ -Only for half an hour.
- ☐ -It wasn't very difficult.

2. The company needs to decide ___ and for all what its position is on this point.

☐here ☐once ☐first ☐finally

3. Don't out your cup on the ___ of the table - someone will knock it off.

☐outside ☐edge
☐boundary ☐border

4. We had a vegetable garden which was ___ through the kitchen door.

☐possessed ☐convertible
☐excessive ☐accessible

5. Steven ___ the wallet.

☐admitted to steal
☐admitted steal
☐admitted to stealing
☐admitted stealing

6. I am going to a wedding. I need to ___

☐be cutting my hair
☐cutting my hair
☐have my hair cut
☐get cut my hair

7. He is an executive in ___

☐the car industry
☐car industry
☐car industries
☐car industrial

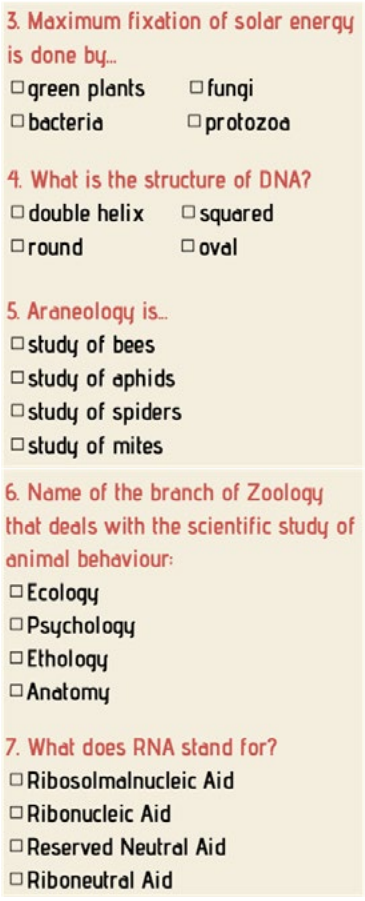
Biology!

1. The richest source of vitamin D is

☐milk ☐cod liver oil
☐cheese ☐spinach

2. The ecosystem consists of...

☐biotic community and its non-living elements
☐population and its non-living elements
☐population
☐biotic community



Source: author's own elaboration.

Appendix 12. Data processing

male_Hum									
		MATH	GEO	LIT	ENG	BIO	Individual average divergence for all subjects	Individual verdict for all subjects	Individual absolute average divergence for all subjects
1	SAYS	4	3	2	3	2			
	GETS	5	4	4	3	2			
	SAYS ⊔ GETS	-0,25	-0,33	-1,00	0,00	0,00	-0,32	underestimates	0,32
2	SAYS	5	4	2	4	2			
	GETS	5	4	3	3	3			
	SAYS ⊔ GETS	0,00	0,00	-0,50	0,25	-0,50	-0,15	underestimates	0,25
3	SAYS	1	3	3	1	2			
	GETS	3	3	4	2	3			
	SAYS ⊔ GETS	-2,00	0,00	-0,33	-1,00	-0,50	-0,77	underestimates	0,77
4	SAYS	3	4	3	4	4			
	GETS	2	3	5	4	3			
	SAYS ⊔ GETS	0,33	0,25	-0,67	0,00	0,25	0,03	overestimates	0,30
5	SAYS	2	4	3	4	3			
	GETS	2	4	3	2	3			
	SAYS ⊔ GETS	0,00	0,00	0,00	0,50	0,00	0,10	overestimates	0,10
6	SAYS	2	5	4	4	3			
	GETS	4	5	5	2	4			
	SAYS ⊔ GETS	-1,00	0,00	-0,25	0,50	-0,33	-0,22	underestimates	0,42
7	SAYS	5	3	2	4	2			
	GETS	5	4	4	3	3			
	SAYS ⊔ GETS	0,00	-0,33	-1,00	0,25	-0,50	-0,32	underestimates	0,42
8	SAYS	3	4	4	5	2			
	GETS	3	5	4	3	4			
	SAYS ⊔ GETS	0,00	-0,25	0,00	0,40	-1,00	-0,17	underestimates	0,33
9	SAYS	3	3	3	3	4			
	GETS	5	2	3	3	3			
	SAYS ⊔ GETS	-0,67	0,33	0,00	0,00	0,25	-0,02	underestimates	0,25
10	SAYS	2	4	2	3	1			
	GETS	3	3	3	2	1			
	SAYS ⊔ GETS	-0,50	0,25	-0,50	0,33	0,00	-0,08	underestimates	0,32
11	SAYS	5	4	2	4	2			
	GETS	5	4	3	3	3			
	SAYS ⊔ GETS	0	0	-0,333333	0,33333333	-0,33333333	-0,07	underestimates	0,20
12	SAYS	3	5	4	5	3			
	GETS	3	4	5	5	4			
	SAYS ⊔ GETS	0,00	0,20	-0,25	0,00	-0,33	-0,08	underestimates	0,16
13	SAYS	4	4	3	4	3			
	GETS	2	4	2	2	4			
	SAYS ⊔ GETS	0,50	0,00	0,33	0,50	-0,33	0,20	overestimates	0,33
14	SAYS	3	4	4	4	3			
	GETS	5	4	4	4	5			
	SAYS ⊔ GETS	-0,67	0,00	0,00	0,00	-0,67	-0,27	underestimates	0,27
15	SAYS	3	2	2	2	2			
	GETS	4	2	3	1	3			
	SAYS ⊔ GETS	-0,33	0,00	-0,50	0,50	-0,50	-0,17	underestimates	0,37
16	SAYS	4	4	4	4	4			
	GETS	2	2	3	1	2			
	SAYS ⊔ GETS	0,50	0,50	0,25	0,75	0,50	0,50	overestimates	0,50
17	SAYS	4	5	5	4	5			
	GETS	2	2	1	1	1			
	SAYS ⊔ GETS	0,50	0,60	0,80	0,75	0,80	0,69	overestimates	0,69
18	SAYS	5	4	4	4	5			
	GETS	2	3	2	2	1			
	SAYS ⊔ GETS	0,60	0,25	0,50	0,50	0,80	0,53	overestimates	0,53
19	SAYS	3	5	5	5	3			
	GETS	1	2	2	1	2			
	SAYS ⊔ GETS	0,67	0,60	0,60	0,80	0,33	0,60	overestimates	0,60
20	SAYS	5	5	5	5	5			
	GETS	2	2	3	1	2			
	SAYS ⊔ GETS	0,60	0,60	0,40	0,80	0,60	0,60	overestimates	0,60
21	SAYS	4	4	4	4	4			
	GETS	2	2	1	1	2			
	SAYS ⊔ GETS	0,50	0,50	0,75	0,75	0,50	0,60	overestimates	0,60

22	SAYS	4	4	4	4	4			
	GETS	2	2	2	1	1			
	SAYS ⊡ GETS	0,50	0,50	0,50	0,75	0,75	0,60	overestimates	0,60
23	SAYS	4	4	4	5	4			
	GETS	1	2	1	2	1			
	SAYS ⊡ GETS	0,75	0,50	0,75	0,60	0,75	0,67	overestimates	0,67
24	SAYS	4	5	4	5	4			
	GETS	2	1	2	2	3			
	SAYS ⊡ GETS	0,50	0,80	0,50	0,60	0,25	0,53	overestimates	0,53
25	SAYS	5	4	4	5	5			
	GETS	1	2	3	2	1			
	SAYS ⊡ GETS	0,80	0,50	0,25	0,60	0,80	0,59	overestimates	0,59
26	SAYS	3	5	5	5	5			
	GETS	3	1	1	2	1			
	SAYS ⊡ GETS	0,00	0,80	0,80	0,60	0,80	0,60	overestimates	0,60
27	SAYS	5	5	4	5	4			
	GETS	1	3	2	1	1			
	SAYS ⊡ GETS	0,80	0,40	0,50	0,80	0,75	0,65	overestimates	0,65
28	SAYS	4	5	5	4	4			
	GETS	2	1	2	3	1			
	SAYS ⊡ GETS	0,50	0,80	0,60	0,25	0,75	0,58	overestimates	0,58
29	SAYS	4	4	4	4	4			
	GETS	1	2	1	2	2			
	SAYS ⊡ GETS	0,75	0,50	0,75	0,50	0,50	0,60	overestimates	0,60
30	SAYS	5	4	4	5	4			
	GETS	1	3	2	2	1			
	SAYS ⊡ GETS	0,80	0,25	0,50	0,60	0,75	0,58	overestimates	0,58
31	SAYS	4	4	4	4	4			
	GETS	1	1	1	1	2			
	SAYS ⊡ GETS	0,75	0,75	0,75	0,75	0,50	0,70	overestimates	0,70
32	SAYS	4	3	4	4	4			
	GETS	2	2	2	1	1			
	SAYS ⊡ GETS	0,50	0,33	0,50	0,75	0,75	0,57	overestimates	0,57
33	SAYS	5	4	4	5	4			
	GETS	1	2	1	2	1			
	SAYS ⊡ GETS	0,80	0,50	0,75	0,60	0,75	0,68	overestimates	0,68
34	SAYS	4	4	4	4	4			
	GETS	1	2	2	1	2			
	SAYS ⊡ GETS	0,75	0,50	0,50	0,75	0,50	0,60	overestimates	0,60
35	SAYS	3	5	5	4	4			
	GETS	2	3	2	1	3			
	SAYS ⊡ GETS	0,33	0,40	0,60	0,75	0,25	0,47	overestimates	0,47
36	SAYS	3	5	5	5	5			
	GETS	2	1	1	1	1			
	SAYS ⊡ GETS	0,33	0,80	0,80	0,80	0,80	0,71	overestimates	0,71
37	SAYS	2	2	2	5	5			
	GETS	1	2	1	2	3			
	SAYS ⊡ GETS	0,50	0,00	0,50	0,60	0,40	0,40	overestimates	0,40
38	SAYS	5	5	5	5	5			
	GETS	1	3	4	1	2			
	SAYS ⊡ GETS	0,80	0,40	0,20	0,80	0,60	0,56	overestimates	0,56
39	SAYS	2	3	5	5	3			
	GETS	1	4	1	2	2			
	SAYS ⊡ GETS	0,50	-0,33	0,80	0,60	0,33	0,38	overestimates	0,51
40	SAYS	4	4	4	5	3			
	GETS	2	3	2	2	1			
	SAYS ⊡ GETS	0,50	0,25	0,50	0,60	0,67	0,50	overestimates	0,50
41	SAYS	3	3	3	3	3			
	GETS	2	4	2	2	1			
	SAYS ⊡ GETS	0,33	-0,33	0,33	0,33	0,67	0,27	overestimates	0,40
42	SAYS	3	3	5	5	2			
	GETS	5	5	4	3	4			
	SAYS ⊡ GETS	-0,67	-0,67	0,20	0,40	-1,00	-0,35	underestimates	0,59

43	SAYS	4	4	2	4	2			
	GETS	3	4	2	4	3			
	SAYS ⊔ GETS	0,25	0,00	0,00	0,00	-0,50	-0,05	underestimates	0,15
44	SAYS	3	2	3	3	3			
	GETS	5	3	3	3	2			
	SAYS ⊔ GETS	-0,67	-0,50	0,00	0,00	0,33	-0,17	underestimates	0,30
45	SAYS	4	3	3	3	3			
	GETS	4	3	3	3	2			
	SAYS ⊔ GETS	0,00	0,00	0,00	0,00	0,33	0,07	overestimates	0,07
46	SAYS	3	4	4	5	4			
	GETS	3	3	3	5	3			
	SAYS ⊔ GETS	0,00	0,25	0,25	0,00	0,25	0,15	overestimates	0,15
47	SAYS	3	3	5	5	2			
	GETS	5	4	3	4	3			
	SAYS ⊔ GETS	-0,67	-0,33	0,40	0,20	-0,50	-0,18	underestimates	0,42
48	SAYS	3	4	2	4	3			
	GETS	5	3	3	4	4			
	SAYS ⊔ GETS	-0,67	0,25	-0,50	0,00	-0,33	-0,25	underestimates	0,35
49	SAYS	2	2	4	5	5			
	GETS	4	5	4	3	3			
	SAYS ⊔ GETS	-1,00	-1,50	0,00	0,40	0,40	-0,34	underestimates	0,66
50	SAYS	4	4	3	4	1			
	GETS	4	5	4	3	3			
	SAYS ⊔ GETS	0,00	-0,25	-0,33	0,25	-2,00	-0,47	underestimates	0,57

Overall average divergence for all subjects	**21,35%**
Overall verdict for all subjects	overestimates
Overall average divergence for MATH	13,46%
Overall verdict for MATH	overestimates
Overall average divergence for GEO	17,12%
Overall verdict for GEO	overestimates
Overall average divergence for LIT	19,02%
Overall verdict for LIT	overestimates
Overall average divergence for ENG	40,78%
Overall verdict for ENG	overestimates
Overall average divergence for BIO	16,34%
Overall verdict for BIO	overestimates

Overall average absolute divergence for all subjects	**45,20%**
Overall average absolute divergence for MATH	49,08%
Overall average absolute divergence for GEO	36,08%
Overall average absolute divergence for LIT	43,20%
Overall average absolute divergence for ENG	44,71%
Overall average absolute divergence for BIO	52,94%

female_Hum									
		MATH	GEO	LIT	ENG	BIO	Individual average divergence for all subjects	Individual verdict for all subjects	Individual absolute average divergence for all subjects
1	SAYS	3	2	4	4	3			
	GETS	3	3	4	5	3			
	SAYS - GETS	0,00	-0,50	0,00	-0,25	0,00	-0,15	underestimates	0,15
2	SAYS	1	4	5	5	3			
	GETS	3	4	4	4	3			
	SAYS - GETS	-2,00	0,00	0,20	0,20	0,00	-0,32	underestimates	0,48
3	SAYS	2	3	3	3	4			
	GETS	3	3	4	2	3			
	SAYS - GETS	-0,50	0,00	-0,33	0,33	0,25	-0,05	underestimates	0,28
4	SAYS	3	4	5	3	5			
	GETS	3	3	3	1	2			
	SAYS - GETS	0,00	0,25	0,40	0,67	0,60	0,38	overestimates	0,38
5	SAYS	4	4	2	4	3			
	GETS	3	4	4	3	4			
	SAYS - GETS	0,25	0,00	-1,00	0,25	-0,33	-0,17	underestimates	0,37
6	SAYS	3	3	4	4	3			
	GETS	4	3	5	2	3			
	SAYS - GETS	-0,33	0,00	-0,25	0,50	0,00	-0,02	underestimates	0,22
7	SAYS	2	4	4	4	2			
	GETS	2	2	2	3	3			
	SAYS - GETS	0,00	0,50	0,25	0,25	-1,50	-0,10	underestimates	0,50
8	SAYS	4	4	5	4	3			
	GETS	3	1	3	2	2			
	SAYS - GETS	0,25	0,75	0,40	0,50	0,33	0,45	overestimates	0,45
9	SAYS	4	3	4	5	4			
	GETS	4	3	4	3	3			
	SAYS - GETS	0,00	0,00	0,00	0,40	0,25	0,13	overestimates	0,13
10	SAYS	3	5	5	5	3			
	GETS	3	4	3	3	4			
	SAYS - GETS	0,00	0,20	0,40	0,40	-0,33	0,13	overestimates	0,27
11	SAYS	3	1	3	3	1			
	GETS	4	3	4	2	3			
	SAYS - GETS	-0,333333	-2	-0,333333	0,3333333	-2	-0,87	underestimates	1,00
12	SAYS	2	3	3	3	4			
	GETS	3	3	4	1	4			
	SAYS - GETS	-0,50	0,00	-0,33	0,67	0,00	-0,03	underestimates	0,30
13	SAYS	3	4	5	3	4			
	GETS	5	5	3	3	3			
	SAYS - GETS	-0,67	-0,25	0,40	0,00	0,25	-0,05	underestimates	0,31
14	SAYS	3	5	5	5	3			
	GETS	2	4	4	4	3			
	SAYS - GETS	0,33	0,20	0,20	0,20	0,00	0,19	overestimates	0,19
15	SAYS	4	5	4	4	1			
	GETS	4	3	4	2	3			
	SAYS - GETS	0,00	0,40	0,00	0,50	-2,00	-0,22	underestimates	0,58
16	SAYS	3	4	3	3	4			
	GETS	2	2	3	1	3			
	SAYS - GETS	0,33	0,50	0,00	0,67	0,25	0,35	overestimates	0,35
17	SAYS	1	2	2	2	2			
	GETS	4	3	3	2	3			
	SAYS - GETS	-3,00	-0,50	-0,50	0,00	-0,50	-0,90	underestimates	0,90
18	SAYS	4	3	3	4	2			
	GETS	3	2	4	4	3			
	SAYS - GETS	0,25	0,33	-0,33	0,00	-0,50	-0,05	underestimates	0,28
19	SAYS	4	3	4	4	2			
	GETS	3	3	3	4	3			
	SAYS - GETS	0,25	0,00	0,25	0,00	-0,50	0,00	overestimates	0,20
20	SAYS	4	4	5	5	4			
	GETS	4	3	5	4	4			
	SAYS - GETS	0,00	0,25	0,00	0,20	0,00	0,09	overestimates	0,09
21	SAYS	4	5	4	5	2			
	GETS	5	3	5	3	5			
	SAYS - GETS	-0,25	0,40	-0,25	0,40	-1,50	-0,24	underestimates	0,56

22	SAYS	3	3	3	3	2			
	GETS	5	4	4	5	3			
	SAYS - GETS	-0,67	-0,33	-0,33	-0,67	-0,50	-0,50	underestimates	0,50
23	SAYS	3	2	4	5	3			
	GETS	4	2	3	2	3			
	SAYS - GETS	-0,33	0,00	0,25	0,60	0,00	0,10	overestimates	0,24
24	SAYS	1	3	1	4	3			
	GETS	3	3	4	3	4			
	SAYS - GETS	-2,00	0,33	-3,00	0,25	-0,33	-0,95	underestimates	1,18
25	SAYS	3	3	3	2	2			
	GETS	3	3	3	2	3			
	SAYS - GETS	0,00	0,00	0,00	0,00	-0,50	-0,10	underestimates	0,10
26	SAYS	4	4	3	4	4			
	GETS	3	3	3	5	3			
	SAYS - GETS	0,25	0,25	0,00	-0,25	0,25	0,10	overestimates	0,20
27	SAYS	3	4	2	3	3			
	GETS	4	3	3	2	3			
	SAYS - GETS	-0,33	0,25	-0,50	0,33	0,00	-0,05	underestimates	0,28
28	SAYS	3	4	3	5	2			
	GETS	4	3	4	3	3			
	SAYS - GETS	-0,33	0,25	-0,33	0,40	-0,50	-0,10	underestimates	0,36
29	SAYS	4	2	2	5	4			
	GETS	4	4	4	4	3			
	SAYS - GETS	0,00	-1,00	-1,00	0,20	0,25	-0,31	underestimates	0,49
30	SAYS	3	5	4	4	4			
	GETS	4	5	4	3	3			
	SAYS - GETS	-0,33	0,00	0,00	0,25	0,25	0,03	overestimates	0,17
31	SAYS	3	4	5	5	3			
	GETS	3	4	5	3	3			
	SAYS - GETS	0,00	0,00	0,00	0,40	0,00	0,08	overestimates	0,08
32	SAYS	3	4	3	4	2			
	GETS	5	3	5	3	5			
	SAYS - GETS	-0,67	0,25	-0,67	0,25	-1,50	-0,47	underestimates	0,67
33	SAYS	2	3	5	3	3			
	GETS	3	3	4	2	3			
	SAYS - GETS	-0,50	0,00	0,20	0,33	0,00	0,01	overestimates	0,21
34	SAYS	4	4	4	5	3			
	GETS	4	4	4	4	5			
	SAYS - GETS	0,00	0,00	0,00	0,20	-0,67	-0,09	underestimates	0,17
35	SAYS	3	5	4	2	2			
	GETS	3	4	4	1	4			
	SAYS - GETS	0,00	0,20	0,00	0,50	-1,00	-0,06	underestimates	0,34
36	SAYS	3	4	4	1	3			
	GETS	4	3	4	2	4			
	SAYS - GETS	-0,33	0,25	0,00	-1,00	-0,33	-0,28	underestimates	0,38
37	SAYS	4	3	2	2	3			
	GETS	3	3	3	2	3			
	SAYS - GETS	0,25	0,00	-0,50	0,00	0,00	-0,05	underestimates	0,15
38	SAYS	3	3	3	4	2			
	GETS	2	3	2	1	1			
	SAYS - GETS	0,33	0,00	0,33	0,75	0,50	0,38	overestimates	0,38
39	SAYS	3	3	4	4	3			
	GETS	3	3	3	2	2			
	SAYS - GETS	0,00	0,00	0,25	0,50	0,33	0,22	overestimates	0,22
40	SAYS	1	2	2	3	1			
	GETS	2	3	3	1	3			
	SAYS - GETS	-1,00	-0,50	-0,50	0,67	-2,00	-0,67	underestimates	0,93
41	SAYS	4	4	4	2	4			
	GETS	3	2	3	1	3			
	SAYS - GETS	0,25	0,50	0,25	0,50	0,25	0,35	overestimates	0,35
42	SAYS	4	5	4	5	3			
	GETS	2	2	4	2	3			
	SAYS - GETS	0,50	0,60	0,00	0,60	0,00	0,34	overestimates	0,34

43	SAYS	1	4	2	2	4			
	GETS	4	4	3	2	2			
	SAYS ☑ GETS	-3,00	0,00	-0,50	0,00	0,50	-0,60	underestimates	0,80
44	SAYS	1	4	4	5	3			
	GETS	3	4	4	3	3			
	SAYS ☑ GETS	-2,00	0,00	0,00	0,40	0,00	-0,32	underestimates	0,48
45	SAYS	4	4	3	5	2			
	GETS	4	3	3	3	3			
	SAYS ☑ GETS	0,00	0,25	0,00	0,40	-0,50	0,03	overestimates	0,23
46	SAYS	3	4	4	4	2			
	GETS	3	4	3	5	3			
	SAYS ☑ GETS	0,00	0,00	0,25	-0,25	-0,50	-0,10	underestimates	0,20
47	SAYS	2	3	4	4	2			
	GETS	4	4	2	4	1			
	SAYS ☑ GETS	-1,00	-0,33	0,50	0,00	0,50	-0,07	underestimates	0,47
48	SAYS	3	3	3	3	3			
	GETS	3	3	4	3	3			
	SAYS ☑ GETS	0,00	0,00	-0,33	0,00	0,00	-0,07	underestimates	0,07
49	SAYS	3	4	4	5	2			
	GETS	3	3	3	4	2			
	SAYS ☑ GETS	0,00	0,25	0,25	0,20	0,00	0,14	overestimates	0,14
50	SAYS	3	4	4	4	3			
	GETS	5	4	4	4	3			
	SAYS ☑ GETS	-0,67	0,00	0,00	0,00	0,00	-0,13	underestimates	0,13

Overall average divergence for all subjects	**-8,99%**
Overall verdict for all subjects	underestimates
Overall average divergence for MATH	-34,31%
Overall verdict for MATH	underestimates
Overall average divergence for GEO	3,43%
Overall verdict for GEO	overestimates
Overall average divergence for LIT	-12,19%
Overall verdict for LIT	underestimates
Overall average divergence for ENG	23,10%
Overall verdict for ENG	overestimates
Overall average divergence for BIO	-24,97%
Overall verdict for BIO	underestimates

Overall average absolute divergence for all subjects	**35,78%**
Overall average absolute divergence for MATH	47,06%
Overall average absolute divergence for GEO	24,67%
Overall average absolute divergence for LIT	30,95%
Overall average absolute divergence for ENG	32,58%
Overall average absolute divergence for BIO	43,66%

femaleNS&Ec									
		MATH	GEO	LIT	ENG	BIO	Individual average divergence for all subjects	Individual verdict for all subjects	Individual absolute average divergence for all subjects
1	SAYS	4	3	4	5	3			
	GETS	4	5	5	5	3			
	SAYS - GETS	0,00	-0,67	-0,25	0,00	0,00	-0,18	underestimates	0,18
2	SAYS	3	3	3	4	3			
	GETS	4	3	3	3	2			
	SAYS - GETS	-0,33	0,00	0,00	0,25	0,33	0,05	overestimates	0,18
3	SAYS	4	2	1	5	3			
	GETS	5	3	3	3	3			
	SAYS - GETS	-0,25	-0,50	-2,00	0,40	0,00	-0,47	underestimates	0,63
4	SAYS	1	4	4	5	3			
	GETS	3	3	3	3	4			
	SAYS - GETS	-2,00	0,25	0,25	0,40	-0,33	-0,29	underestimates	0,65
5	SAYS	5	3	3	4	4			
	GETS	5	3	4	3	3			
	SAYS - GETS	0,00	0,00	-0,33	0,25	0,25	0,03	overestimates	0,17
6	SAYS	4	5	4	5	2			
	GETS	4	4	3	3	3			
	SAYS - GETS	0,00	0,20	0,25	0,40	-0,50	0,07	overestimates	0,27
7	SAYS	4	2	3	4	3			
	GETS	5	3	4	4	3			
	SAYS - GETS	-0,25	-0,50	-0,33	0,00	0,00	-0,22	underestimates	0,22
8	SAYS	3	2	2	3	2			
	GETS	3	3	3	2	2			
	SAYS - GETS	0,00	-0,50	-0,50	0,33	0,00	-0,13	underestimates	0,27
9	SAYS	2	3	2	3	1			
	GETS	4	4	2	4	3			
	SAYS - GETS	-1,00	-0,33	0,00	-0,33	-2,00	-0,73	underestimates	0,73
10	SAYS	4	3	3	4	3			
	GETS	3	4	3	3	2			
	SAYS - GETS	0,25	-0,33	0,00	0,25	0,33	0,10	overestimates	0,23
11	SAYS	5	4	3	3	3			
	GETS	4	5	4	3	3			
	SAYS - GETS	0,25	-0,2	-0,25	0	0	-0,04	underestimates	0,14
12	SAYS	3	2	2	4	2			
	GETS	5	3	3	4	2			
	SAYS - GETS	-0,67	-0,50	-0,50	0,00	0,00	-0,33	underestimates	0,33
13	SAYS	3	4	3	5	4			
	GETS	3	3	2	4	2			
	SAYS - GETS	0,00	0,25	0,33	0,20	0,50	0,26	overestimates	0,26
14	SAYS	4	3	3	5	5			
	GETS	4	4	3	4	3			
	SAYS - GETS	0,00	-0,33	0,00	0,20	0,40	0,05	overestimates	0,19
15	SAYS	5	3	4	5	2			
	GETS	4	3	4	4	3			
	SAYS - GETS	0,20	0,00	0,00	0,20	-0,50	-0,02	underestimates	0,18
16	SAYS	4	3	4	4	5			
	GETS	4	4	4	5	3			
	SAYS - GETS	0,00	-0,33	0,00	-0,25	0,40	-0,04	underestimates	0,20
17	SAYS	2	4	3	4	2			
	GETS	5	3	4	4	4			
	SAYS - GETS	-1,50	0,25	-0,33	0,00	-1,00	-0,52	underestimates	0,62
18	SAYS	2	4	4	5	4			
	GETS	2	4	4	4	3			
	SAYS - GETS	0,00	0,00	0,00	0,20	0,25	0,09	overestimates	0,09
19	SAYS	3	2	2	5	3			
	GETS	3	3	3	3	3			
	SAYS - GETS	0,00	-0,50	-0,50	0,40	0,00	-0,12	underestimates	0,28
20	SAYS	3	4	4	4	3			
	GETS	2	3	4	5	3			
	SAYS - GETS	0,33	0,25	0,00	-0,25	0,00	0,07	overestimates	0,17
21	SAYS	3	4	3	5	4			
	GETS	5	3	3	3	3			
	SAYS - GETS	-0,67	0,35	0,00	0,40	0,35	0,05	overestimates	0,31

22	SAYS	4	3	2	4	1			
	GETS	4	4	2	3	2			
	SAYS ⊔ GETS	0,00	-0,33	0,00	0,25	-1,00	-0,22	underestimates	0,32
23	SAYS	4	4	4	4	4			
	GETS	5	4	4	3	3			
	SAYS ⊔ GETS	-0,25	0,00	0,00	0,25	0,25	0,05	overestimates	0,15
24	SAYS	2	3	2	4	2			
	GETS	3	3	3	5	2			
	SAYS ⊔ GETS	-0,50	0,00	-0,50	-0,25	0,00	-0,25	underestimates	0,25
25	SAYS	5	4	4	3	1			
	GETS	4	4	4	2	2			
	SAYS ⊔ GETS	0,20	0,00	0,00	0,33	-1,00	-0,09	underestimates	0,31
26	SAYS	1	4	5	3	3			
	GETS	3	3	3	2	3			
	SAYS ⊔ GETS	-2,00	0,25	0,40	0,33	0,00	-0,20	underestimates	0,60
27	SAYS	5	2	1	3	5			
	GETS	3	3	4	2	3			
	SAYS ⊔ GETS	0,40	-0,50	-3,00	0,33	0,40	-0,47	underestimates	0,93
28	SAYS	4	4	4	5	3			
	GETS	5	3	4	5	5			
	SAYS ⊔ GETS	-0,25	0,25	0,00	0,00	-0,67	-0,13	underestimates	0,23
29	SAYS	5	3	2	4	2			
	GETS	4	3	3	3	4			
	SAYS ⊔ GETS	0,20	0,00	-0,50	0,25	-1,00	-0,21	underestimates	0,39
30	SAYS	3	4	5	4	4			
	GETS	3	4	4	4	3			
	SAYS ⊔ GETS	0,00	0,00	0,20	0,00	0,25	0,09	overestimates	0,09
31	SAYS	2	4	3	4	3			
	GETS	4	3	3	3	3			
	SAYS ⊔ GETS	-1,00	0,25	0,00	0,25	0,00	-0,10	underestimates	0,30
32	SAYS	3	5	4	3	4			
	GETS	2	3	4	3	4			
	SAYS ⊔ GETS	0,33	0,40	0,00	0,00	0,00	0,15	overestimates	0,15
33	SAYS	4	3	3	5	3			
	GETS	5	4	4	4	3			
	SAYS ⊔ GETS	-0,25	-0,33	-0,33	0,20	0,00	-0,14	underestimates	0,22
34	SAYS	1	4	2	2	4			
	GETS	4	3	3	2	2			
	SAYS ⊔ GETS	-3,00	0,25	-0,50	0,00	0,50	-0,55	underestimates	0,85
35	SAYS	5	5	4	5	1			
	GETS	5	5	5	4	3			
	SAYS ⊔ GETS	0,00	0,00	-0,25	0,20	-2,00	-0,41	underestimates	0,49
36	SAYS	4	3	2	5	2			
	GETS	5	3	4	5	3			
	SAYS ⊔ GETS	-0,25	0,00	-1,00	0,00	-0,50	-0,35	underestimates	0,35
37	SAYS	3	3	3	5	3			
	GETS	4	4	3	4	3			
	SAYS ⊔ GETS	-0,33	-0,33	0,00	0,20	0,00	-0,09	underestimates	0,17
38	SAYS	2	3	5	3	3			
	GETS	3	2	3	2	3			
	SAYS ⊔ GETS	-0,50	0,33	0,40	0,33	0,00	0,11	overestimates	0,31
39	SAYS	5	3	3	5	1			
	GETS	4	3	3	3	3			
	SAYS ⊔ GETS	0,20	0,00	0,00	0,40	-2,00	-0,28	underestimates	0,52
40	SAYS	5	5	5	4	2			
	GETS	6	3	5	4	5			
	SAYS ⊔ GETS	-0,20	0,40	0,00	0,00	-1,50	-0,26	underestimates	0,42
41	SAYS	5	3	1	5	4			
	GETS	5	3	4	5	3			
	SAYS ⊔ GETS	0,00	0,00	-3,00	0,00	0,25	-0,55	underestimates	0,65
42	SAYS	4	4	2	4	3			
	GETS	4	3	4	3	3			
	SAYS ⊔ GETS	0,00	0,25	-1,00	0,25	0,00	-0,10	underestimates	0,30

43	SAYS	5	2	3	2	2			
	GETS	4	2	3	1	3			
	SAYS - GETS	0,20	0,00	0,00	0,50	-0,50	0,04	overestimates	0,24
44	SAYS	4	2	3	3	2			
	GETS	5	2	3	2	3			
	SAYS - GETS	-0,25	0,00	0,00	0,33	-0,50	-0,08	underestimates	0,22
45	SAYS	4	3	3	4	3			
	GETS	3	3	2	2	3			
	SAYS - GETS	0,25	0,00	0,33	0,50	0,00	0,22	overestimates	0,22
46	SAYS	5	5	3	5	3			
	GETS	5	3	4	4	3			
	SAYS - GETS	0,00	0,40	-0,33	0,20	0,00	0,05	overestimates	0,19
47	SAYS	4	4	3	3	3			
	GETS	4	3	1	1	3			
	SAYS - GETS	0,00	0,25	0,67	0,67	0,00	0,32	overestimates	0,32
48	SAYS	4	4	4	2	4			
	GETS	4	2	3	1	3			
	SAYS - GETS	0,00	0,50	0,25	0,50	0,25	0,30	overestimates	0,30
49	SAYS	3	2	4	2	2			
	GETS	4	3	3	2	3			
	SAYS - GETS	-0,33	-0,50	0,25	0,00	-0,50	-0,22	underestimates	0,32
50	SAYS	2	3	3	4	3			
	GETS	2	2	3	3	3			
	SAYS - GETS	0,00	0,33	0,00	0,25	0,00	0,12	overestimates	0,12

Overall average divergence for all subjects	**-10,97%**
Overall verdict for all subjects	underestimates
Overall average divergence for MATH	-25,42%
Overall verdict for MATH	underestimates
Overall average divergence for GEO	-2,71%
Overall verdict for GEO	underestimates
Overall average divergence for LIT	-23,69%
Overall verdict for LIT	underestimates
Overall average divergence for ENG	18,30%
Overall verdict for ENG	overestimates
Overall average divergence for BIO	-21,34%
Overall verdict for BIO	underestimates

Overall average absolute divergence for all subjects	**31,76%**
Overall average absolute divergence for MATH	36,47%
Overall average absolute divergence for GEO	23,56%
Overall average absolute divergence for LIT	36,76%
Overall average absolute divergence for ENG	22,55%
Overall average absolute divergence for BIO	39,44%

maleNS&EC									
		MATH	GEO	LIT	ENG	BIO	Individual average divergence for all subjects	Individual verdict for all subjects	Individual absolute average divergence for all subjects
1	SAYS	5	4	2	4	2			
	GETS	5	4	3	3	3			
	SAYS ⊟ GETS	0,00	0,00	-0,50	0,25	-0,50	-0,15	underestimates	**0,25**
2	SAYS	4	3	3	3	3			
	GETS	5	3	4	2	3			
	SAYS ⊟ GETS	-0,25	0,00	-0,33	0,33	0,00	-0,05	underestimates	**0,18**
3	SAYS	4	5	2	1	2			
	GETS	3	3	4	3	2			
	SAYS ⊟ GETS	0,25	0,40	-1,00	-2,00	0,00	-0,47	underestimates	**0,73**
4	SAYS	5	5	1	5	1			
	GETS	4	4	3	4	3			
	SAYS ⊟ GETS	0,20	0,20	-2,00	0,20	-2,00	-0,68	underestimates	**0,92**
5	SAYS	4	4	1	5	1			
	GETS	5	3	3	5	4			
	SAYS ⊟ GETS	-0,25	0,25	-2,00	0,00	-3,00	-1,00	underestimates	**1,10**
6	SAYS	3	5	4	2	3			
	GETS	4	3	4	1	2			
	SAYS ⊟ GETS	-0,33	0,40	0,00	0,50	0,33	0,18	overestimates	**0,31**
7	SAYS	5	2	5	5	2			
	GETS	5	5	4	3	3			
	SAYS ⊟ GETS	0,00	-1,50	0,20	0,40	-0,50	-0,28	underestimates	**0,52**
8	SAYS	5	3	2	4	2			
	GETS	5	4	4	3	3			
	SAYS ⊟ GETS	0,00	-0,33	-1,00	0,25	-0,50	-0,32	underestimates	**0,42**
9	SAYS	5	4	3	5	2			
	GETS	3	3	4	3	2			
	SAYS ⊟ GETS	0,40	0,25	-0,33	0,40	0,00	0,14	overestimates	**0,28**
10	SAYS	3	3	3	3	4			
	GETS	5	2	3	3	3			
	SAYS ⊟ GETS	-0,67	0,33	0,00	0,00	0,25	-0,02	underestimates	**0,25**
11	SAYS	3	3	2	4	2			
	GETS	5	4	2	2	2			
	SAYS ⊟ GETS	-0,4	-0,25	0	1	0	0,07	overestimates	**0,33**
12	SAYS	3	5	5	4	4			
	GETS	5	3	5	5	4			
	SAYS ⊟ GETS	-0,67	0,40	0,00	-0,25	0,00	-0,10	underestimates	**0,26**
13	SAYS	4	5	4	4	3			
	GETS	5	4	4	4	3			
	SAYS ⊟ GETS	-0,25	0,20	0,00	0,00	0,00	-0,01	underestimates	**0,09**
14	SAYS	4	2	2	3	1			
	GETS	5	3	4	5	3			
	SAYS ⊟ GETS	-0,25	-0,50	-1,00	-0,67	-2,00	-0,88	underestimates	**0,88**
15	SAYS	4	2	2	3	1			
	GETS	5	4	4	5	3			
	SAYS ⊟ GETS	-0,25	-1,00	-1,00	-0,67	-2,00	-0,98	underestimates	**0,98**
16	SAYS	3	5	2	4	3			
	GETS	4	5	2	3	3			
	SAYS ⊟ GETS	-0,33	0,00	0,00	0,25	0,00	-0,02	underestimates	**0,12**
17	SAYS	4	4	3	4	2			
	GETS	5	3	3	4	2			
	SAYS ⊟ GETS	-0,25	0,25	0,00	0,00	0,00	0,00	overestimates	**0,10**
18	SAYS	4	2	3	4	4			
	GETS	5	3	4	4	3			
	SAYS ⊟ GETS	-0,25	-0,50	-0,33	0,00	0,25	-0,17	underestimates	**0,27**
19	SAYS	3	4	3	5	2			
	GETS	4	3	3	4	2			
	SAYS ⊟ GETS	-0,33	0,25	0,00	0,20	0,00	0,02	overestimates	**0,16**

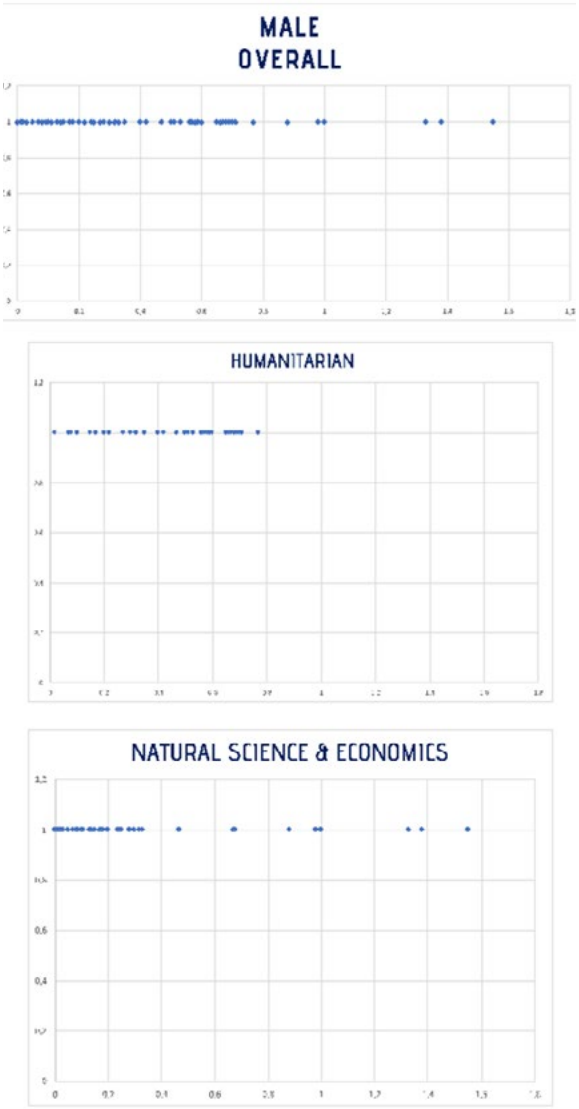
40	SAYS	3	4	2	4	3			
	GETS	5	3	3	4	4			
	SAYS ⊟ GETS	-0,67	0,25	-0,50	0,00	-0,33	-0,25	underestimates	0,35
41	SAYS	5	3	3	4	3			
	GETS	4	3	5	4	3			
	SAYS ⊟ GETS	0,20	0,00	-0,67	0,00	0,00	-0,09	underestimates	0,17
42	SAYS	4	3	4	4	2			
	GETS	4	3	4	3	2			
	SAYS ⊟ GETS	0,00	0,00	0,00	0,25	0,00	0,05	overestimates	0,05
43	SAYS	4	4	3	5	3			
	GETS	4	4	3	3	3			
	SAYS ⊟ GETS	0,00	0,00	0,00	0,40	0,00	0,08	overestimates	0,08
44	SAYS	4	4	3	5	5			
	GETS	4	3	3	2	3			
	SAYS ⊟ GETS	0,00	0,25	0,00	0,60	0,40	0,25	overestimates	0,25
45	SAYS	3	3	3	5	2			
	GETS	5	5	3	4	3			
	SAYS ⊟ GETS	-0,67	-0,67	0,00	0,20	-0,50	-0,33	underestimates	0,41
46	SAYS	5	4	3	5	4			
	GETS	5	4	4	3	2			
	SAYS ⊟ GETS	0,00	0,00	-0,33	0,40	0,50	0,11	overestimates	0,25
47	SAYS	3	5	3	5	3			
	GETS	4	5	3	5	2			
	SAYS ⊟ GETS	-0,33	0,00	0,00	0,00	0,33	0,00	overestimates	0,13
48	SAYS	3	3	2	2	4			
	GETS	4	5	2	3	3			
	SAYS ⊟ GETS	-0,33	-0,67	0,00	-0,50	0,25	-0,25	underestimates	0,35
49	SAYS	3	4	2	4	2			
	GETS	5	4	2	5	3			
	SAYS ⊟ GETS	-0,67	0,00	0,00	-0,25	-0,50	-0,28	underestimates	0,28
50	SAYS	4	4	3	4	1			
	GETS	4	5	4	3	3			
	SAYS ⊟ GETS	0,00	-0,25	-0,33	0,25	-2,00	-0,47	underestimates	0,57

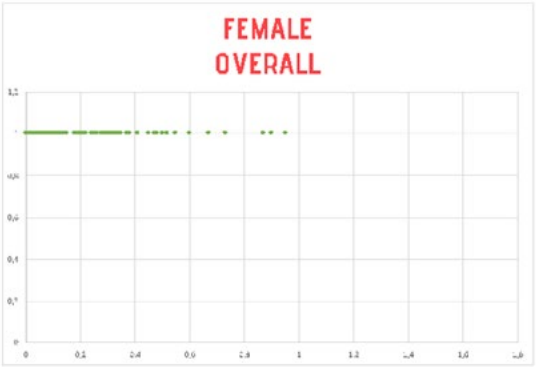
Overall average divergence for all subjects	**-22,64%**
Overall verdict for all subjects	underestimates
Overall average divergence for MATH	-16,18%
Overall verdict for MATH	underestimates
Overall average divergence for GEO	-15,75%
Overall verdict for GEO	underestimates
Overall average divergence for LIT	-46,21%
Overall verdict for LIT	underestimates
Overall average divergence for ENG	2,75%
Overall verdict for ENG	overestimates
Overall average divergence for BIO	-37,81%
Overall verdict for BIO	underestimates

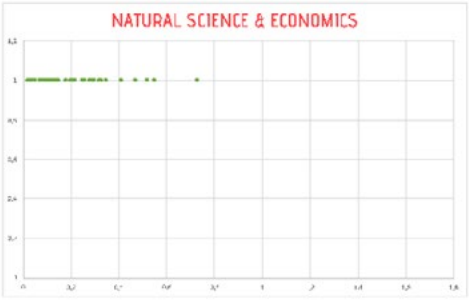
Overall average absolute divergence for all subjects	**40,42%**
Overall average absolute divergence for MATH	25,59%
Overall average absolute divergence for GEO	37,84%
Overall average absolute divergence for LIT	49,87%
Overall average absolute divergence for ENG	29,87%
Overall average absolute divergence for BIO	58,92%

Source: author's own elaboration based on the empirical study.

Appendix 13. Scatter plot







Source: author's own collaboration.

An important and interesting topic, rarely raised in literature, particularly in our country, which is due to its political and social sensitivity. This makes the reflections resulting from research of methodological and organising nature even more valuable.

Dr hab. Jacek Brdulak, prof. SGH

The author of the publication has taken up very interesting and topical research issues. The analyses are focused on the gender socialisation concept and the so-called illusion of explanatory depth, a phenomenon that has not been afforded a lot of research time so far. She empirically tested the correlation between the illusion of explanatory depth and gender socialisation. Her findings indicated that persons belonging to the same social group have a tendency towards different behaviours and using their knowledge depending on their (broadly understood) gender.

Dr hab. Joanna Działo, prof. UŁa

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