



## ***Gender Identity in the Perspective of Bio-psychological Approaches – Analysis, Reconstruction, and Discussion<sup>1</sup>***

### **SUMMARY**

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The study considers the results of biologists' efforts in their search for neuro-hormonal factors of gender identity with reference to the complexity of the issue of sex and gender in psychology as an anthropological science. Considering the theoretical and meta-theoretical multiplicity of the latter, as well as its vain empirical results the biological perspective may serve to verify the approaches used in the area of psychology *sensu stricto*. They may then shed some additional light on the question of gender identity. On the other hand though, they may themselves become an object to be analysed and assessed with regard to their cognitive value. In order to achieve this goal, the first part of the text presents an outline of the psychology of sex and gender underlying the main questions that lead the psychologists' efforts in this research area. The second part presents the reconstructed issues in the perspective of biology as well as the discussion on the cognitive value of the perspective in question.

**KEYWORDS** – GENDER IDENTITY, SEX DIFFERENCES, AGENCY, BIOLOGICAL PSYCHOLOGY, PSYCHOLOGY OF SEX AND GENDER

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<sup>1</sup> The hyphen used in the title is to underline the metatheoretical character of presented considerations. Thus, they do not merely refer to the relation between biological factors and psychological functioning as it is the case in "standard" biopsychology. The objectives set up in this text are rather to present, compare and critically analyse two approaches of different character, i.e. psychological and biological, to the broadly taken issue of gender identity as an anthropological question.

Tożsamość płciowa w świetle badań bio-psychologicznych –  
analiza, rekonstrukcja i dyskusja

**STRESZCZENIE**

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Podstawowym zadaniem zawartych w tekście rozważań jest prezentacja stanu badań z zakresu biologicznych uwarunkowań tożsamości płciowej w odniesieniu do zróżnicowanej problematyki psychologii płci rozumianej jako dyscyplina antropologiczna. W obliczu teoretycznego i metateoretycznego zróżnicowania tej ostatniej oraz niejednoznaczności zgromadzonego na tym obszarze materiału empirycznego podejścia biologiczne mogą posłużyć za swego rodzaju weryfikację ujęć psychologicznych *sensu stricto*. W ten sposób mogą rzucić pewne dodatkowe światło na sprawę płciowości człowieka. Z drugiej strony jednak mogą przy tym same stać się przedmiotem analizy oraz oceny ich waloru poznawczego. W tym celu artykuł prezentuje najpierw zarys psychologicznej problematyki płci z jej zagadnieniami wiodącymi. W drugiej części natomiast przywołane zostają podejścia biologiczne oraz wnioski, które płyną z ich zastosowania.

**SŁOWA KLUCZOWE** – TOŻSAMOŚĆ PŁCIOWA, RÓŻNICE PŁCIOWE,  
PODMIOTOWOŚĆ, BIOPSYCHOLOGIA, PSYCHOLOGIA  
PŁCI

## Introduction

The study aims considers the bio-psychological approaches to the question of gender identity as well as at their cognitive value in the context of both the theoretical and paradigmatic psychology of sex and gender. Psychology has long taken up the issue of the sexes. As a result, this is now an area of research rich in theories, empirical data, and overarching perspectives used as paradigms of psychology of sex and gender. All this multiplicity however may appear unsatisfactory, inconclusive and in vain.

Recent decades are also marked, thanks to technological development, by considerable growth in research on biological conditions of specific elements of gender identity. In the face of the vain results of psychological perspective *sensu stricto* biological approach(es) may serve, to some extent, as supporting evidence for those psychological conceptions but also shed some light on the basic and crucial issue of status – i.e. position and rank – of biological factors of gender identity and thus on the question

of possible ways of influencing and shaping it. At the same time, this intensive development of biological approaches to the question of gender identity seems advanced enough to be assessed for their cognitive value – their prospects and limits – in the context of theoretical and empirical challenges encountered in the area of the psychology of the sexes.

In order to achieve this goal, the first part of the study presents an outline of the psychology of sex and gender with its theoretical and meta-theoretical variety as well as a discussion of the cognitive value of reconstructed approaches. The second part focuses on biological theories as yet other approach shedding additional light on the issues put forward in the area of the psychology of sex and gender. It also presents the conclusions of their cognitive evaluation with regard to the challenges encountered by the psychology of the sexes.

### **An outline of the psychology of sex and gender – theories, paradigms, conclusions**

In 1894 English sexologist Havelock Ellis in his book *Man and Woman: a study of human secondary sexual character* called for a scientific – empirical – examination of the issue of the psychological differences between men and women which had been posited earlier by philosophers, poets, and social writers.<sup>2</sup> His postulate can be taken as a characteristic element of the genesis of psychological scientific interest in the sexes. That period brought forth an avalanche of research on the differences between men and women in motor, perceptual, and intellectual skills that were commonly believed to exist. Researchers, however, focused on intelligence though. They also started to use a certain theoretical model explaining such differences: sex → brain anatomy → intelligence → determining social status and performance of women and men.<sup>3</sup> It soon turned out that empirical data do not confirm the existence of sex differences in intelligence. In 1917 Lewis Madison Terman, who had analysed

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<sup>2</sup> Cf. H. Ellis, *Man and Woman: a study of human secondary sexual character*, London 1894.

<sup>3</sup> Cf. R.D. Ashmore, *Sex, Gender, and the Individual*, in: *Handbook of personality. Theory and research*, ed. L.A. Pervin, New York 1990, pp. 447-448.

the scores achieving by children of both sexes in the Binet-Simon test, concluded that the far poorer performance of women in the area of public activity and at the same time only slight differences in intelligence, furthermore in favor of girls, must have resulted from social-political factors.<sup>4</sup>

The data gathered then appeared contrary to common sense, but experienced and expressed then by academics, who believed that if other sciences, e.g. anatomy, physiology, pathology could show the differences between women and men, why couldn't psychology?<sup>5</sup> In such circumstances Joseph Jastrow, who considered the construct of intelligence a limited artifact, put forward a new theoretical proposal. According to this American psychologist of Polish origin, intelligence is accompanied by deeper and more overall processes which build up the its basis and determine the way it is used. They should be regarded as more crucial to the functioning of mind. That is why the main objective of the psychology of sexes should be to gain insight into a deeper and more subtle sphere revealing what may turn out to be essential for mind and spirit.<sup>6</sup> The approach presented in 1936 by Lewis M. Terman and Catherine C. Miles in their book *Sex and Personality: Studies in Masculinity and Femininity* can be regarded as an attempt to do so.<sup>7</sup> Terman and Miles understood masculinity and femininity as personality traits according to the theoretical model: nature or nurture → masculinity – femininity → individual differences in behavior and adjustment. The concept they put forward served as a theoretical basis for the construction of a questionnaire “assessing” femininity and masculinity called *Attitude Interest Analysis Test (AIST)* to disguise its real purpose. According to the survey procedure carried out by the authors, femininity consists of dispositions such as: nursing, engagement in problems of others, liking children; and masculinity, for example: disobedience, hunting and enduring excessive

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<sup>4</sup> Cf. *ibidem*, p. 448.

<sup>5</sup> Cf. J.G. Morawski, *The Measurement of Masculinity and Femininity: Engendering Categorical Realities*, in: *Gender and Personality: Current Perspectives on Theory and Research*, eds. J.A. Stewart, M.B. Lykes, Durham 1985, p. 202.

<sup>6</sup> Cf. J. Jastrow, *The Psychology of Conviction*, Boston, New York 1918, p. 314.

<sup>7</sup> Cf. L.M. Terman, C.C. Miles, *Sex and Personality: Studies in Masculinity and Femininity*, New York 1936.



pain. The tool was based on three basic assumptions: 1) masculinity – femininity are deep-seated, enduring characteristics of men and women, 2) they are at opposing ends of a continuum (thus, in the individual, the more psychological femininity, the less psychological masculinity and *vice versa*), 3) an incongruence in sex and gender (for example, little femininity in biological women and little masculinity in biological men) is likely to result in psychological disorders. Almost forty years later Sandra L. Bem, following the same tradition of thinking in categories of personality traits, elaborated and put forward a tool of basically different construction and theoretical assumptions.<sup>8</sup> The *Bem Sex Role Inventory* (BSRI) – as in the case of *Personal Attributes Questionnaire* (PAQ) by Spence et al.<sup>9</sup> – consists of two only loosely interrelated scales assessing masculinity (defined for example by: independence, analytical approach, acting as a leader) and femininity (defined for example by: being affectionate, gentle, sensitive to the needs of others). Thus, both dimensions do not contradict each other as in the case of AIST, but bring about and include at least four possible resulting categorizations: a high score on the masculinity scale and low one on the femininity scale (masculine), a low score in the masculine category and a high score in feminine one (feminine), but also low on both scales (undifferentiated) and high on both ones – people who score above the median on both scales are classified as androgynous. Moreover, Bem does not claim psychological femininity as congruent and appropriate for women and psychological masculinity as right for men as it is according to Terman and Miles in their AIST. On the contrary, the “optimal” score is to be classified in the category of androgyny that is thought to be the most adaptive.

Another milestone in the field of psychology of sex and gender is said to be a postulate put forward in 1982 by Carolyn W. Sherif in her article under the suggestive title “Needed Concepts

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<sup>8</sup> Cf. S.L. Bem, *The Measurement of Psychological Androgyny*, “Journal of Consulting and Clinical Psychology”, 42/1974, pp. 165-173.

<sup>9</sup> Cf. J.T. Spence, R.L. Helmreich, J. Stapp, *Ratings of self and peers on sex-role attributes and their relation to self-esteem and conceptions of masculinity and femininity*, “Journal of Personality and Social Psychology”, 32/1975, pp. 29-39.

in the Study of Gender Identity.”<sup>10</sup> The text was a constructive proposal after a wave of criticism, *inter alia*, prompted by researchers’ disenchantment with M-F scales. There seem to be three distinctive points of these critiques: unsatisfactory empirical results, regarding masculinity and femininity thus, diminishing the role of the subject in the process of shaping both its own gender identity and gender as a cultural phenomenon. Sherif calls for a perspective that would allow the social and cultural character of sex understood as gender to be noticed but on the other hand on its subjective (agentic) features that enables the individual to play an active role in the process of shaping his or her gender identity.

Tracing the history of the psychology of the sexes, it is possible to notice at least three main approaches that may even be regarded as paradigms of the psychology of sex and gender: sex differences, gender as a personality variable and sex as a social category.<sup>11</sup> It would also be difficult not to notice the connection between reconstructed approaches and the main currents of philosophical thinking. Thus, approaching the question of the sexes within the perspective of the sex differences paradigm – including taking it up with the use of “personality trait” category – appears to belong to the essentialist tradition, both in its realistic Aristotelian and nominalist Lockean version.<sup>12</sup> This theoretical perspective that can be called sex as a social category paradigm clearly refers to social constructionism and constructivism theories.

## Sex differences

The focal area of the psychology of sex and gender is concerned with sex differences. As shown above, since the beginning of psychologists’ concern with the question of gender

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<sup>10</sup> C. Sherif, *Needed concepts in the Study of Gender Identity*, “Psychology of Women Quarterly”, 6(4)/1982, pp. 375-398.

<sup>11</sup> Cf. R.D. Ashmore, *Sex, Gender, and the Individual*, op. cit.

<sup>12</sup> Cf. J. Bielas, *Paradigmatic conditions of psychologists’ concern with sex and gender*, in: *Understanding Sex and Gender*, eds. A. Kuczyńska, E.K. Dzikowska, Wrocław 2006, pp. 25-33; E. Hyży, *Kobieta, ciało, tożsamość. Teorie podmiotu w filozofii feministycznej końca XX*, Kraków 2003.

identity, this very aspect was regarded as the central research objective. The issue consists of two component questions: first, and in what regard, do women differ from men, and if so in what regard, do men differ from women psychologically? If this is the case, where do these differences come from? The answer to the first of these questions, not to mention the second has so far been unsatisfactory. One can, for example, refer to a monumental work *The Psychology of Sex Differences* by Eleonore E. Maccoby and Carol N. Jacklin wherein the authors presented the results of several studies on differences between men and women in intellectual, emotional, and social activity.<sup>13</sup> The conclusion drawn from this analysis was that there are few such differences and those which exist are small.

Intensive development of IT technology fosters more effective research of the kind called meta-analysis. It is now possible to collect and compare any number of research reports on specific sex differences in psychological functioning. According to one of these analyses, sex differences can be grouped into three classes depending on the frequency and force of their appearance in reports.<sup>14</sup>

The most evident differences occur in motor skills, aggression, and sexual behavior. Besides the difference in body size men turn out to be more skilful at locating themselves in space and at throwing small objects on target. Women have better memory for locating small objects and better bodily coordination. As for aggression, men appear to be more aggressive especially when a) physical activity is concerned, b) harm is considerable, c) aggressive behavior is thought to be socially acceptable. The individual woman shows a lower level of aggression especially when she believes women are not aggressive. Evident sex differences also occur in sexual activity which seem to support the perspective of evolutionary psychology.

Sex differences that occur to a lesser degree include communication activity and some other aspects of social conduct. The results of the meta-analysis show women as more verbally skilful. This is also true of non-verbal communication. Women

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<sup>13</sup> Cf. E.E. Maccoby, C.N. Jacklin, *The Psychology of Sex Differences*, Stanford 1974.

<sup>14</sup> Cf. B. Wojciszke, *Psychologiczne różnice płci*, „Wszechświat. Pismo przyrodnicze”, 113(1-3)/2012, pp. 13-18.

make more use of facial expression, mimicry and tone of voice. They are also more skilful at reading other peoples' nonverbal messages. Men tend to be more prone to hazardous activities and are less vulnerable to social pressure.

It turns out that the slightest sex differences encompass differences in personality traits and temperament, except for neuroticism. Women appear to be slightly more prone to anxiety and depression and tend to be slightly more reactive.

## Gender identity in the light of biopsychology

Both the historic and systematic meta-theoretical analysis, of the psychology of sex and gender gives an opportunity to trace and reconstruct two crucial, questions that have led and still lead psychologists in their efforts to understand the sexes. These are the questions about psychological differences between men and women as well as the role and the qualifications of the subject (as the agent) in the process of shaping its (his/her) gender identity. Since the answers given by psychologists dealing with the problem of sexes appear to be unclear and controversial, using bio-psychological approaches may bring about a verification of results achieved so far with the use of strictly psychological methods as well as theoretical inspiration and possible signposts for further research. Relating gender identity as it appears in the perspective of psychology *sensu stricto* to the one approached in the field of biological sciences, may contribute to the cognitive value of the latter in the context of overall anthropological perspective on the question of sexes.

The theories of the biological conditions of sex differences focus on the level of sex hormones and functional anatomy of the brain. For example, research shows the relation between the level of androgens and aggression or hazardous behavior. Infant girls with excessive adrenal glands in the prenatal and neonatal period are intensively exposed to androgens, exhibit behavior characteristic for boys when older: they tend to fight, like war games and car races.<sup>15</sup> Androgens have an impact on the process of developing brain structures conditioning specific

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<sup>15</sup> Cf. S.A. Berenbaum, M. Hines, *Early androgens are related to childhood sex-typed toy preferences*, "Psychological Science" 3/1992, pp. 203-206.



behaviors as well as the process of stimulating the development of neuronal circuits sensitive to this kind of substance.<sup>16</sup> It turns out that the level of sex steroids also influences visual-spatial and verbal abilities.<sup>17</sup> Functional anatomy of the brain also exhibits sexual differentiation that relates to verbal activity. Women have more neurons in von Economo's area TA<sub>1</sub> of the lateral sulcus which is regarded as conditioning language skills.<sup>18</sup> Research on hormonal fluctuation during the menstrual cycle supports the evidence that steroids may influence visual-spatial and verbal abilities. They show that in those phases in which the level of estradiol rises, the performance in spatial tasks becomes poorer, however, it goes up when the level of estradiol drops.<sup>19</sup> Similar mechanisms are also observed in the case of verbal skills. In the phases of higher level of estradiol women perform better on verbal tasks than when the estrogens lower.<sup>20</sup>

Since the research carried out by Money et al.,<sup>21</sup> Dörner<sup>22</sup> and LeVay<sup>23</sup> the focus has also been on the biological determinants of sexual orientation. It is thus said that homosexuality may be determined by some structures of hypothalamus resulting

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<sup>16</sup> Cf. A. Grabowska, *Mózg w mocy hormonów*, „Kosmos. Problemy nauk biologicznych”, 52/2003, p. 31.

<sup>17</sup> Cf. R. Nass, S. Baker, *Androgen effects on cognition: congenital adrenal hyperplasia*, “Psychoneuroendocrinology”, 16/1991, pp. 189-201; J. Imperator-McGinley, M. Pichardo, T. Gautier, D. Voyer, M. Bryden, *Cognitive abilities in androgen-insensitive subjects: comparison with control males and females from the same kindred*, “Clinical Endocrinology” 34/1991, pp. 341-347.

<sup>18</sup> Cf. A. Czarnańska, *Czy mózg ma płeć? Różnice płciowe w budowie ludzkiego mózgu*, „Kosmos. Problemy nauk biologicznych”, 52/2003, p. 25.

<sup>19</sup> Cf. S. Phillips, B.B. Sheriwin, *Variations in memory function and sex steroid hormones across the menstrual cycle*, “Psychoneuroendocrinology”, 17/1992b, pp. 497-506; E. Hampson, *Estrogen-related variations in human spatial and articulatory motor skills*, “Psychoneuroendocrinology”, 15/1990b, pp. 97-111.

<sup>20</sup> Cf. A. Grabowska, *Mózg w mocy hormonów*, op. cit., p. 34.

<sup>21</sup> Cf. J. Money, M. Shwartz, V.G. Levis, *Adult erotosexual status and fetal hormonal masculinization and demasculinization: 46,XX congenital virilizing adrenal hyperplasia and 46,XY androgen-insensitivity syndrome compared*, “Psychoneuroendocrinology”, 9/1984, pp. 405-414.

<sup>22</sup> Cf. G. Dörner, *Sex-specific gonadotrophin secretion, sexual orientation and gender role behaviour*, “Experimental and Clinical Endocrinology” 86/1985, pp. 1-6.

<sup>23</sup> Cf. S. LeVay, *A difference in hypothalamic structure between heterosexual and homosexual men*, „Science”, 253/1991, pp. 1034-1037.

from hormonal disturbances in the prenatal period. LeVay et al. showed that one of interstitial nuclei of the anterior hypothalamus – INAH-3 – is bigger in men than in women and in heterosexual men than in male homosexuals.<sup>24</sup> Swaab and Fliers also found that another hypothalamic structure called the suprachiasmatic nucleus (SCN) is 150% bigger and consists of twice as many neurons in homosexual men than in heterosexual ones.<sup>25</sup> Biological conditions of sexual orientation were already posited by Money et al. whose research showed that girls with a high level of androgens due to excessive adrenal glands are more likely to exhibit homosexual and bisexual behavior.<sup>26</sup>

Referring to biological factors of psychological differences between men and women it is also worth considering alternative theories of the origin of these determinants themselves. There used to be a widely shared opinion according to which sex differences are the effect of the process of hormonal masculinizing of the male brain (and to lesser extent – hormonal feminization of the female brain) under the influence of male and female sex hormones respectively. The primary sexual differentiation of initially undifferentiated (until the age of 6 weeks) embryos was supposed to be determined by chromosomally encoded steroids. Although the research that has lately been carried out, including experiments on animals confirmed that hormonal mechanisms play an important role in the process of sexual differentiation of female and male brains and also proved they are not the only mechanisms responsible for the process primarily determined by genetic characteristics. According to recent research genes located on sex chromosomes may directly encode sexual dimorphism of female and male brains.<sup>27</sup> There is also a long disputed question and controversy over the neurobiological basis of human sexual orientation. Some recent preliminary research may turn out to shed new light on the question of the genesis of homosexual preferences. They go beyond the neuro-anatomical model and

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<sup>24</sup> Ibidem.

<sup>25</sup> Cf. D.F. Swaab, E. Fliers, *A sexually dimorphic nucleus in the human brain*, "Science", 228/1985, pp. 1112-1115.

<sup>26</sup> Cf. J. Money, M. Schwartz, V.G. Levis, *Adult erotosexual status and fetal hormonal masculinization and demasculinization*, op. cit.

<sup>27</sup> Cf. W. Davies, L.S. Wilkinson, *It is not all hormones: alternative explanations for sexual differentiation of the brain*, "Brain Research" 18/2006, pp. 36-45.

focus on mechanisms of functional neural circuitry which can be triggered either by direct genetic influence (the focus is now on candidate genes located on the X chromosome) or by sex hormones active in the early stage of embryo development. In the latest literature, there are also alternative theories postulating the mechanism of immunologically determined damage in the structures of the central nervous system of a fetus caused by the mother's immune system. The evidence presented in this stage of research does not allow any definite conclusions to be drawn concerning the role of these mechanisms in the development of human homosexual orientation.<sup>28</sup> One must also take into consideration that the process of anatomical and functional sexual dimorphism of the brain is not completed at birth. The prenatal development of the central nervous system goes on intensively until the end of adolescence with the most intensive dynamics within the first two years of life.

Thus, searching for possible factors which may turn out to influence the process of anatomical and functional dimorphism of the brain of women and men, one should not focus merely on the models explaining prenatal brain development but also on the early stages of childhood.

### Biopsychological theories of a sense of gender identity

One of the basic and essential matters of the psychology of sex and gender, regardless of whether they appear explicitly or implicitly, is the issue of gender identity which in its existential aspect refers to the question who am I – a woman, a man, a person of another sex or no sex at all. The issue turns up in its full weight while concerning the question of the genesis of gender identity which consists of a set of component questions: where does it come from, in other words, what causes it, is it possible not to experience it, if so, under which circumstances, and what is its cognitive value? When formulated in this way, the issue relates to the overall matter of the psychology of sex and gender, but first of all to the question of the subjective (agentic) character

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<sup>28</sup> Cf. Q. Rahman, *The neurodevelopment of human sexual orientation*, "Neuroscience & Biobehavioral Reviews" 29(7)/2005, pp. 1057-1066.

of man as far as his/her sex is concerned. Bio-psychological theories may then shed some light on the issues as well as on the theories themselves – their cognitive value in relation to the weight of questions formulated in the area of psychology *sensu stricto* treated as an anthropological field.<sup>29</sup>

Biological theories of the genesis of gender identity focus on the structure and the endocrine function of the hypothalamic-pituitary-gonadal axis. Although, in this case as well, focus is on the endocrine system of human body as conditioning gender identity,<sup>30</sup> the bulk of the research aims at one of the hypothalamic structures called the bed nucleus of the stria terminalis (BST), or more precisely its central part (BSTc). In 1995 Zhou et al. discovered that the central part of BST is 44% bigger in men (a mean 2,49 mm<sup>3</sup> of size) than in women (a mean 1,73 mm<sup>3</sup>), and in M-F transsexuals, it is similar to biological women (a mean 1,30 mm<sup>3</sup>).<sup>31</sup> Moreover, homosexual men do not present such an anomaly. The finding was confirmed in 2000 by Kruijver et al. Furthermore, they indicated that BSTc is not only smaller in women but is also 71% less dense than in man. The number of neurons in M-F transsexuals is typical for women.<sup>32</sup> The BST theory was, and still is, mostly based on *post mortem* examination of the transsexuals' brains. In cases of trans-sexualism, a sense of gender identity appears and can be regarded as somehow opposed or even contradictory to other elements that make up the individual's sex and gender. So, from a theoretical standpoint, such cases could help in finding some relatively isolated anomaly in men's and women's brains possibly determining this aspect of one's identity. It was then believed that BSTc may turn out to be such a structure. Two years later,

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<sup>29</sup> Cf. J. Bielas, *Bio-psychologiczne koncepcje genezy poczucia tożsamości płciowej*, in: *Wokół genezy człowieka. Studia i rozprawy*, ed. P.S. Mazur, Kraków 2013, pp. 145-162.

<sup>30</sup> As far as this issue is concerned it is also worth to recognize Polish researchers' contribution, e.g. K. Kula, M. Pawlikowski, *Gonadotropins and gonadal function in transsexualism and hypospadias*, in: *Systemic hormones, neurotransmitters and brain development*, eds. G. Dörner, I. Martini, Basel 1986, pp. 69-74.

<sup>31</sup> Cf. N. Zhou, M.A. Hofman, L.J. Gooren, D.F. Swaab, *A sex difference in the human brain and its relation to transsexuality*, "Nature", 378/1995, pp. 68-70.

<sup>32</sup> Cf. F.P.M. Kruijver, J.N. Zhou, C.W. Pool, M.A. Hofman, L.J. Gooren, D.F. Swaab, *Male-to-female transsexuals have female neuron numbers in a limbic nucleus*, "Journal of Clinical Endocrinology and Metabolism", 85/2000, pp. 2034-2041.



Chung et al. demonstrated however, that the bed nucleus of the stria terminalis does not show its sexual dimorphism until adulthood.<sup>33</sup> Cross-sexed gender identity is, however, often already experienced by transsexual people in childhood.

A detailed analysis of biological and bio-psychological theories of gender identity has already been presented elsewhere.<sup>34</sup> It is perhaps worth reviewing some characteristic features of the biological perspectives. One of them is a fragmentary way of those approaches. It could be assumed, that a sense of gender identity is directly related to the overall structure of the individual's sex and gender. It could result from one of its component elements, including bodily experiences. Yet within the perspective of the reviewed approaches, the sense of being a woman and a man is related to rather an isolated structure of the central nervous system. It is also quite unclear which of the features in the characteristics of BSTc determine a sense of gender identity. Is it its size, the number and density of nerve cells this structure consists of, or maybe some substances (like somatostatin and vasoactive intestinal peptide) produced in the process the BST neurons take part in, or maybe the location and function of the structure in question? Finally, the relation between sexual dimorphism of BSTc and the psychological aspect, i.e. the experience of being a woman or a man, to which the structure is thought to relate to, is also unclear. Do particular characteristics of the structure determine a sense of gender identity or, on the contrary, result from some processes going on in psychological sphere – including social, cultural and upbringing processes – and shaping this biological factor of a sense of gender identity that is BSTc.

## Concluding remarks

The considerations presented here aimed at bio-psychological approaches to the issue of gender identity. They were introduced and explored to relate to the challenges faced in the

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<sup>33</sup> Cf. W.C. Chung, G.J. De Vries, D.F. Swaab, *Sexual differentiation of the bed nucleus of the stria terminalis in humans may extend into adulthood*, "Journal of Neuroscience" 2002, 22, pp. 1027-1033.

<sup>34</sup> Cf. J. Bielas, *Bio-psychologiczne koncepcje genezy poczucia tożsamości płciowej*, op. cit.

psychology of sex and gender *sensu stricto* recognized as an anthropological field and then to assess the cognitive value of the biological perspective of a human being which is her/his gender identity. Therefore, in the first part the authors outlined<sup>35</sup> the psychology of sex and gender with its two leading issues: the question of sex differences and their ontological character as well as, the subject's condition in the process of shaping its gender identity. Concerning the first of the questions, the biological approaches introduced in the second part confirm some sex differences in spatial-motor abilities, the level of aggression, sexual behavior, communication skills and a tendency to hazardous actions. They can thus indicate some biological basis of the differences which can be regarded as "in tune" with those anthropological perspectives that belong to the tradition of real essentialism. The extent to which the differences satisfy our intuitive notion concerning the essence of femininity and masculinity, still remains a question. Furthermore, it should be underlined that the biological character of such differences does not rule out an agent factor in overall gender identity and the subject's ability to react to, influence or even shape it. It is worth emphasising the results of the research on the second of the reconstructed leading questions of the psychology of sexes i.e. the issue of the genesis of gender identity which is regarded according to Jolanta Miluska as the basic and general experience of one's own sex and gender.<sup>36</sup> So far its biological determinants have not been found and those theories that function in the area of biology and biopsychology seem fragmentary and unclear about which properties of the postulated structures of the body are responsible for a sense of gender identity as well as the direction of a cause-and-effect relationship between biological and psychological aspects. This situation may evoke some doubts whether the term "a sense of gender identity" is at all adequate or maybe it should rather be replaced by the phrase "identifying with sex and gender" in a more constructionist perspective. It seems, however, that according to the present state of bio-psychological knowledge, it is too early to draw such far-reaching and definite conclusions.

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<sup>35</sup> Cf. R.D. Ashmore, op. cit.; J. Bielas, *Doświadczenie cielesności. Podmiotowe uwarunkowania transseksualizmu*, Kraków 2012; J. Bielas, *Paradigmatic conditions of psychologists' concern with sex and gender*, op. cit.

<sup>36</sup> Cf. J. Miluska, *Tożsamość kobiet i mężczyzn w cyklu życia*, Poznań 1996.

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