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WAS JOHN B. WATSON INSPIRED BY ANNA WYCZÓŁKOWSKA
AND HER STUDIES IN THE MECHANISM OF SPEECH?

Abstract. In 1913, an article by Anna Wyczółkowska entitled *Theoretical and experimental studies in the mechanism of speech* was published in the *Psychological Review*. It contains the results of her studies on internal speech and thought, which had been carried out by the author seven years earlier, in the psychological laboratory of the University of Chicago. John B. Watson was a participant in the study. Wyczółkowska believed that Watson was inspired by her research. Thanks to his participation, he gradually began to move away from his original interest in animal psychology, towards behaviourism. In his *Behaviorist Manifesto* published in the same year, Watson took, as one of the arguments for the rightness of his programme, the assumption that the *thought process is really motor habits in the larynx, improvements, short cuts, changes, etc.* According to Wyczółkowska, it was obviously inspired by her research. Her aforementioned article is still cited in the psychological literature today, and belongs to the canon of the most important early experimental studies in the field of research on thinking and speech processes. This text discusses the relationship between the research conducted by Wyczółkowska and some assumptions of behaviourism. Furthermore it presents the story of Wyczółkowska's life, her scientific work, social commitment to women's university education, and activities in the Polish American community.

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1. Introduction

In his famous *Behaviorist Manifesto* Watson wrote: *wherever there are thought processes, there are faint contractions of the systems of musculature involved in the overt exercise of the customary act, and especially in the still finer systems of musculature involved in speech*¹. This idea was an important foundation of behaviourism. It was based, among other experiments, on the results of research that Watson participated in seven years earlier. These experiments were conducted at the University of Chicago by Anna Wyczółkowska, a Polish psychologist. Watson never mentioned his participating in Wyczółkowska's research, nor the inspiration it may have given him that broadened his scientific interests. In his biography he made only a brief remark on the origin of his behaviorist idea: *At Chicago, I first began a tentative formulation of my later point of view*.² This account gives the wrongful impression that Watson, without any outside influence, including the work of his predecessors or the exchange of ideas with other researchers, began to develop the ideas that he later used to construct his concept of behaviourism. Who Anna Wyczółkowska was and what her relationship was with the founder of behaviourism, I will try to answer in this article.

2. The life and work of Anna Wyczółkowska

The family of Anna Wyczółkowska came from that part of the former Polish–Lithuanian Commonwealth that after the partitioning of Poland in the late 18th century was occupied by the Austrian Empire (known between 1867 and 1918 as Austria–Hungary). The province was called the *Kingdom of Galicia and Lodomeria*. Anna's father, Henryk Dulęba, was the prefect of the town of Nowy Sącz. Around 1842, he moved to Cracow and settled there with his second wife, Maria Wyczółkowska, also a descendant of the Galician gentry. For many years he worked as the administrator of the Polish Theatre in Cracow³. Anna Maria Dulęba (later Wyczółkowska) was born on 7 November 1853, in Cracow⁴. The early years of her life did not, however, foreshadow her future interests and career. She studied until 1874 at one of the Cracow schools

¹ J. B. Watson, *Psychology as the behaviorist views it*, p. 174.

² J. B. Watson, *John Broadus Watson*, p. 276.

³ Basic biographical facts were established on the basis of archival documentation from Polish archives.

⁴ An interesting and symbolic coincidence is that fourteen years later on the same date, November 7th, another prominent female scientist was born: Maria Skłodowska–Curie, whose path to success required similar sacrifices as those experienced by Wyczółkowska. Both of them had to cope with financial problems, which were an obstacle to their academic education; both were educated and conducted research far from their homeland; both faced social resistance against women scientists. Also, their romantic lives were fairly complicated.

for the education and upbringing of *ladies of society*. She also received music lessons, and when it became clear that she was talented in this field, she was sent for further study in Vienna. She graduated with honours from the Vienna Conservatory specializing in piano, concertina performances and musical composition. Anna Maria Dulęba planned to become a private teacher. In the summer of 1875, she moved from Cracow to Warsaw, searching for any source of income.

We know very little about the next six years of her life. In 1876, she passed her pedagogical exam in Cracow. This was necessary for her to hold private piano lessons for children of wealthy citizens. She supported herself with this work, but this was an existence that was too simple for her potential and ambitions. Having saved up some money for further study, Anna Maria Dulęba left to study philosophy at the Sorbonne University (1883–1886). However, her funds ran out and she had to stop her studies due to financial considerations. After some time, probably around 1888 her family found an unusual solution for this situation. Convinced by her mother, Anna Maria Dulęba decided to make a very peculiar step in her private life – she married her own uncle, the younger brother of her mother. According to both contemporary civil and church law, this close affinity was not an obstacle to marriage. Anna's uncle, Cyryl Wyczółkowski, was almost thirty years older than she. He was born in 1825 and graduated from the prestigious Theresian Military Academy in Vienna. He served with the Austrian army for over twenty years, advancing from the rank of lieutenant to the rank of major, and retired in 1868¹. Cyryl Wyczółkowski was a wealthy person. Marriage to him granted financial freedom to his young wife and she could finally take the career steps that were previously unavailable to her; for example, to continue her education at a foreign university. Her husband set no limits to her plans in this field. Most likely the marriage had a solely formal character; they had no children, and Cyryl remained in the shadow of his young wife.

In 1889, Anna Dulęba (henceforward, Anna Wyczółkowska) published an article in a Korneuburg (Lower Austria) journal, entitled *Über die Erweiterung der Frauenbildung* [*On the broadening of women's education*]². This text argued against the stereotypes that made access to university education troublesome and scientific work impossible for women. The issue of the inclusion of women in academic society was, from that date on, one of the main objectives of her social activity.

In Autumn 1891 Wyczółkowska returned to university in Zurich. She enlisted in the Faculty of Philosophy, studying under the direction of Richard Avenarius, Andreas Ludwig Kym, and Justus Gaule, among others, and attended lectures in psychology, the history of philosophy, experimental physiology, the philosophy of law, as well as physiological chemistry. In the summer of 1893, she was awarded the degree of doctor of philosophy on the

¹ See J. Svoboda, *Die Theresianische Militär-Akademie ...*

² See A. von Wyczolkowska, *Über die Erweiterung der Frauenbildung*.

basis of a dissertation that compared the teachings of Schopenhauer on freedom of the will with similar teachings by Kant and Schelling¹. This achievement was recognized by the Polish press; university degrees awarded to women were still a rarity at that time. It was stressed that Wyczółkowska was one of just thirteen women who in that year were awarded doctoral degrees by Swiss universities.

On 20 October 1895 Cyryl Wyczółkowski passed away in Vienna due to complications of pneumonia² and Anna Wyczółkowska became a widow. She then moved to Galicia. Being aware of the significant interest of women in psychological issues, she decided to hold public lectures on the subject. Starting in January 1897, she conducted a three-month course in experimental psychology in Lwów, and a year later, in Cracow. One of the journalists wrote, with high regard, about the standard of her lectures, stating that *these are works of broader style, with European aspirations*³.

In autumn 1898, Wyczółkowska conducted, in the Department of Physiology of the Jagiellonian University in Cracow, research concerning the perception of optical illusions. The main experiment concerned measurement of the rate at which the observer perceives the change of perspective of a geometrical solid (the Necker–Wheatstone cube)⁴. She also investigated whether the rate of change in the subject's perception of the cube has something to do with the pulse rate⁵.

At that time Wyczółkowska also undertook several scientific voyages. She became an intern with Carl Stumpf in Berlin and Sigmund Exner at the Institute of Physiology of Vienna University. During such short study stays, she became acquainted with the subject of psychophysiological research and research equipment. In 1900 Wyczółkowska gave a lecture at the 4th International Psychological Congress in Paris. There she met, among others, Hugo Münsterberg, who, appreciating her scientific talents, encouraged her to conduct further research, and also suggested her moving to the United States – where she could familiarize herself with trends in American psychological research. Shortly after that, she received an offer of employment in Paris. Her success was described in one of the issues of the famous feminist magazine edited by Marguerite Durant, *La Fronde*, as Wyczółkowska was the first woman in Paris to be employed in the position of professor of psychology. The offer came from Edgar Berillon, who led the *psycho-physiological school* (*L'École* or *l'Institut Psycho-physiologique*). Wyczółkowska started lecturing on the psychology of

¹ See A. Wyczółkowska, *Schopenhauers Lehre von der menschlichen Freiheit ...*.

² *Verstorbene*, Wiener Zeitung, 27 Nov. 1895, p. 15.

³ Z. P–vi [Z. Parvi], *Listy krakowskie III*, p. 97.

⁴ This figure was popularized in psychological research (e.g. on fluctuations of attention, temperamental differences, authoritarianism, figural spontaneous flexibility) two decades after the publication of Wyczółkowska's article, possibly as the result of an opinion by J. P. Guilford & K. W. Braly, *An experimental test of McDougall's theory ...*, p. 389, that [t]he rate of fluctuation of the Necker–Wheatstone cube is a highly reliable measure of some psychological function.

⁵ See A. Wyczółkowska, *O iluzjach optycznych*.

senses and the psychometrics¹. After several weeks, she was able to truly reveal her vast psychological knowledge and her ability to transfer it to her audience. The reporter of the Polish newspaper wrote in his correspondence from Paris: *Lectures of Dr. Wyczółkowska in the School of psychology enjoy large popularity, attracting vast publicity.*²

After several months, Wyczółkowska resigned from work at the Berillon Institute. It was a school intended for doctors and private persons who wanted to study in the field of hypnotism, psychophysiology and the practical application of suggestion. Wyczółkowska had no medical education, she was not practising psychotherapy, and she was interested in pursuing studies related to experimental scientific psychology. She benefited from the proposals of Münsterberg and went by sea to the United States to look for further possibilities of personal development there. Her first visit to the United States of America most likely occurred in September 1902. She decided to settle in Chicago and was quickly involved in working for the benefit of the Polish diaspora in Illinois. We find proof of this in local newspapers, where her social activity was traced for many years³. In November 1905, Wyczółkowska submitted a translation into English of her report from her earlier research on optical illusions to *The Psychological Review*. The article was published in March the following year, under the distorted surname of the author⁴. The Lewis Institute in Chicago was mentioned as her affiliation. We do not know the nature of her relationship with this school; however she was not a full-time employee of the Institute. At the same time James R. Angell invited Wyczółkowska to conduct research in his psychological laboratory at the University of Chicago.

During the winter semester of 1906 (January to March), Wyczółkowska was a resident at the Graduate Schools of Arts, Literature, and Science at the University of Chicago. She studied as a *doctor of philosophy pursuing special courses*⁵. Among those who worked at the Department of Psychology at that time, apart from Professor Angell, was Dr. John B. Watson, holding the position of *instructor of experimental psychology*⁶. Despite the vast research on various subjects conducted by Wyczółkowska in Chicago, she published only one article from these experiments: *Study of Certain Phenomena Concerning the Limit of Beats*⁷. It was a continuation of the research that she had initiated several years earlier in Berlin and completed at the Ryerson Physical Laboratory of the University of Chicago. In it, Wyczółkowska described her experiments on the perception of acoustic stimuli and attempted to explain why different

¹ See Natalie, *L'école psycho-physiologique*, p. 1.

² [Anonymous], *Z Paryża*, p. 3.

³ Extracts from the Polish press in the USA (mainly from *Dziennik Chicagowski* and *Dziennik Związkowy*) are available at <http://flps.newberry.org> [retrieved on Aug. 1, 2020].

⁴ See A. Vicholkovska, *Illusions of Reversible Perspective*.

⁵ *The University of Chicago. Circular of Information for the Year 1906–1907*, p. 138.

⁶ J. R. Angell, *The Department of Psychology*, p. 116.

⁷ See A. Wyczolkowska, *Studies from the psychological laboratory of the University of Chicago ...*

authors (i.e. Wundt, Helmholtz, Stumpf) quote diverging information pertaining to the number of vibrations that give the listener the impression of rumbling¹.

Wyczółkowska returned to Galicia in the spring of 1907. In May, she gave a public lecture on *Polish–American relations*². She particularly valued her experiences in Chicago concerning the organization of universities in the United States, and appreciated the American regulations in this field. In a press article, she compared the educational perspectives of women in Austria–Hungary and in the USA, *inter alia* thus:

We shall not stop our fight for women's rights. Take [...] Lwów University. There are 211 women studying there this year. And at the same time, the number of women administrators and professors is equal to 0. The situation is different today in America. [...] Take Chicago for example, where women enlist for lectures at the female dean's office, with dean Dr. Anna [sic!] Talbot³. She facilitates all formalities and her office, which employs only women, is the place where one can find clarification of all procedures, exams, etc. Every laboratory where there are also female students working, has a female assistant. That is why I believe that the complete lack of female professors in Polish universities is a total anachronism.⁴

This opinion was due to the fact that in the United States Wyczółkowska had arrived at a University that was exceptional, even by American standards. The University of Chicago combined a college in the American style and a Humboldt type of research university. It was a university open to anyone willing to learn, at a time when this possibility was not popular at other universities.

In July 1907 Wyczółkowska gave two lectures during the 10th Congress of Polish Doctors and Naturalists in Lwów. The first lecture concerned the psychology of hearing⁵. It was based on the same material that was previously used for the mentioned text published in *The Psychological Review*. However, the second presentation was more important from the viewpoint of the subject of this article. It presented the results of her Chicago experiments in the psychology of speech and thinking⁶ and it constituted the core of her scientific work which influenced John Watson (as will be discussed later).

At the end of 1907, Wyczółkowska returned to the USA. During this second stay, Wyczółkowska opened a private music school in Chicago. Her students

¹ It is worth noting that in his book *Psychology from the Standpoint of a Behaviorist* (1919), Watson devotes a lot of attention to the subject of reactions to noise stimuli.

² [Anonymous], *W czytelnici kobiet*, p. 3.

³ The Dean of Women at the University of Chicago from 1895 to 1925 was Marion Talbot (1858–1948).

⁴ A. Wyczółkowska, *Meta dyletantyzmu naukowego wśród kobiet we Lwowie*, p. 218.

⁵ See A. Wyczółkowska, *Z psychologii sluchu*.

⁶ See A. Wyczółkowska, *Z psychologii mowy*.

gave public concerts. Furthermore, in 1909, Wyczółkowska, together with Polish social activists in America, organized the *Polish People's University* (PPU) in Chicago. Its objective was *to spread Polish culture among adults, especially the working class, and to teach the Polish language to the youth*¹. She also actively supported socially significant action. In April 1912, a referendum took place in Illinois, concerning the granting of voting rights to women. Wyczółkowska issued an appeal addressed to the men representing the Polish diaspora, encouraging them to positively answer the following question: *Are you in favor of the Extension of Suffrage to Women?* In her appeal, she wrote:

[...] *we address you, dear voters, with a sincere appeal and remembrance, that you are the ones who can stop women being treated in Illinois as equal to children, criminals and lunatics – who are prohibited to vote as the women are. If you write “yes” during the pre-elections held on Tuesday, 9th of April, you will give us the human right that we have craved for centuries; if you write “no”, you will leave us to continued suffering.*²

In 1913, Wyczółkowska again briefly visited Galicia. In Cracow, she published the first volume of *Dualizm organiczny albo mowa i myśl* [*Organic dualism or speech and thought*]³. In the same year, *The Psychological Review* (later known as *Psychological Review*) printed her third article *Theoretical and experimental studies in the mechanism of speech*⁴, which became a milestone in her scientific output. Three years later, she published, in Chicago, the Polish version of the second volume of *Organic dualism or speech and thought*⁵.

At the beginning of October 1921, Wyczółkowska again returned to Poland, expecting that she would be able to join in the rebuilding process of her home country, which after 123 years of occupation, regained independence in 1918. She settled in Warsaw and she applied for the chair of psychology of Lwów University. Unfortunately but typically, members of the Board of the Faculty of Philosophy stated that there was no basis to employ her. The university did not have a vacancy. She was very disappointed that no one in the country wanted to recognize her scientific output and didactic experience. In 1924, Warsaw newspapers published her last articles written in Poland. In one of them she expressed her appreciation for the American lifestyle and education. Fifteen years before Kurt Goldstein had included the *self-actualization* process in his theory, Wyczółkowska had written about striving to realize one's own potential by using inherent skills and abilities. In her other popular article, she drew attention to the high value of work on developing positive personality traits. She believed that schools should teach subjects that would provide students with

¹ L. T. Zglenicki (ed.), *Poles of Chicago 1837–1937*, p. 173.

² [Anonymous], *Z Ameryki*, pp. 6–7.

³ See A. Wyczółkowska, *Dualizm organiczny albo Mowa i myśl. Część pierwsza*.

⁴ See A. Wyczółkowska, *Theoretical and experimental studies ...*

⁵ See A. Wyczółkowska, *Dualizm organiczny albo Mowa i myśl. Część druga: Świadomość*.

guidelines for shaping their characters and developing their intellects. In her article, she referred to the observations made in America and drew attention to the fact that in the English language *there are already many notions [...] of this type, such as: self-respect, self-government or the self-made man, that is respect, composure and shaping oneself. There is no other country that esteems and values people so highly as America does [...]*¹.

In September 1924, Wyczółkowska returned to Chicago. She was aware of her deteriorating health, but was preoccupied mainly with the preparation of handwritten research reports. She published three books in Polish². Her last book *Biologiczne wyjaśnienia mowy i myśli* [*Biological explanations of speech and thoughts*] features reminiscences from her research conducted over twenty years earlier in Chicago. Towards her end, younger friends cared for the seriously ill scientist. Anna Wyczółkowska passed away on 5 March 1929, in her flat at 1152 Milwaukee Ave., in Chicago. She was buried in the St. Adalbert Catholic Cemetery.

3. Watson's change of interests after participating in Wyczółkowska's experiments on speech mechanisms

John Watson was acquainted with the possibility of research on *internal speech* from taking part in Wyczółkowska's experiment. It is hard to find any evidence in his scientific output from that period of any previous interest on his part in this topic. In 1903, he published his first major work: his doctoral dissertation³, which set the scope of his interests pursued in Chicago for the next five years. His subsequent publications do not include revolutionary proposals. Both the terminology applied and the mode of data description and analysis do not differ from the traditional methodology of animal research. Even in his *Manifesto*, Watson admits: *I have devoted nearly twelve years to experimentation on animals.*⁴

The fact that Watson only very generally described his path to behaviourism gives rise to the suspicion that he was reluctant to admit specific inspirations that opened the path to behaviourism to him. That is why the thesis by one of the historians of psychology that *there is no clear line of descent from Watson's animal work to his behaviorism*⁵ is a justified reflection, thus encouraging us to look for likely inspirations. Malone, as well as numerous other authors, indicated prominent researchers who had laid the foundations for behaviour-

¹ A. Wyczółkowska, *Luka w programach szkolnych*, pp. 9–10.

² See A. Wyczółkowska, *Magnetyzm, hipnoza i psychoanaliza ...*, A. Wyczółkowska, *Studjum o Marji Kopnickiej* & A. Wyczółkowska, *Biologiczne wyjaśnienia mowy i myśli*.

³ See J. B. Watson, *Animal Education ...*.

⁴ J. B. Watson, *Psychology as the behaviorist views it*, p. 175.

⁵ J. A. Mills, *Control. A history of behavioral psychology*, p. 58.

ism¹. These were for example William B. Carpenter, Alexander Bain and even ... Sigmund Freud².

According to Watson, *speaking overtly or to ourselves (thinking) is just as objective a type of behavior as baseball*³. Wyczółkowska's experiments, in which Watson participated as a subject, led to a similar conclusion. She conducted research seeking to find the objective measures that could be used in order to study the higher psychological processes. Wyczółkowska described the genesis of her research on the mechanisms of speech and thinking in the following manner: *In Paris, 1901, I noticed a particular connection between the movements of the tongue and those of the right hand. At first they seemed to be only of clinical importance. Later, when giving attention to lingual phenomena in relation to mental, I reverted to them.*⁴ Her experimental studies in the mechanism of speech were conducted during the first months of 1906. As previously noted, she was, at this time, doing her research internship at Angell's psychological laboratory at the University of Chicago. The comparison of subjects that Wyczółkowska and Watson worked on during that time proves significant. Angell presented them in his report for the President of the University: *I submit herewith a report of the research in progress in the Department of Psychology. [...] Dr. A. Wyczółkowska: The Relations Between Thought-Process and the Motor Innervation of the Tongue. Partially complete. [...] Dr. Watson will take up the facts and processes of imitation in the rhesus monkey; also the mental life of pigeons, especially homing pigeons.*⁵ There are visible differences in interests of both researchers.

Unfortunately, Wyczółkowska did not publish the results of her experiments immediately in an American journal, thus postponing the moment of their popularization in a broader scientific circle. However, she presented them in Polish, after her return to Galicia, in a lecture entitled *Z psychologii mowy* [*On psychology of speech*]. She gave it during the 10th Congress of Polish Doctors and Naturalists in Lwów, on 23 July 1907. In her abstract Wyczółkowska formulated the following assumption:

Every word spoken is the product of organic functions, the brain cortex on one hand and the articulating organ on the other. As long as the tongue, larynx, oral cavity and throat are not propelled in motion under the influence of molecular-chemical impulses that travel from the speech centre, the consciousness of the word or sentence remains impossible. This relates both to

¹ See J. C. Malone, *Did John B. Watson really "found" behaviorism?*

² G. Mandler, *A History of Modern Experimental Psychology*, p. 100, introduced the category of *protobehaviorist*. To this category belongs for instance Jacques Loeb. Ivan Sechenov and Ivan Pavlov must not be forgotten in this respect as they are also regarded as intellectual precursors of behaviourism.

³ J. B. Watson, *Behaviorism*, p. 6.

⁴ A. Wyczółkowska, *Theoretical and experimental studies ...*, p. 451.

⁵ J. R. Angell, *The Department of Psychology*, p. 116.

*speaking and reasoning, as well as understanding the speech of other persons.*¹

The assumption was verified by measuring the tongue movements of the tested person while thinking about certain tasks and while listening to the speech of others.

In March 1913, John Watson published the article known as the *Behaviorist Manifesto*. The article, among others, makes the following statements:

*[...] wherever there are thought processes there are faint contractions of the systems of musculature involved in the overt exercise of the customary act, and especially in the still finer systems of musculature involved in speech. [...] I believe that 'consciousness' has just as little to do with improvement in thought processes. Since, according to my view, thought processes are really motor habits in the larynx, improvements, short cuts, changes, etc., in these habits are brought about in the same way that such changes are produced in other motor habits. This view carries with it the implication that there are no reflective processes (centrally initiated processes): The individual is always examining objects, in the one case objects in the now accepted sense, in the other their substitutes, viz., the movements in the speech musculature. From this it follows that there is no theoretical limitation of the behavior method.*²

The thread concerning *internal speech* raises the intriguing question as to why, just several months later, *The Psychological Review* published an article by Wyczółkowska that contained the results of her research from seven years earlier and confirmed the views of Watson. Did Wyczółkowska want to emphasize, in this way, her priority in research on internal processes of speech and thinking? Was it her own decision or did someone else (e.g. Angell) draw her attention to this coincidence and suggest sending the report to *The Psychological Review*? It is difficult to answer these questions today. The fact is, however, that the journal readers learned that the research, which Watson mentioned in his *Manifesto*, had already been done in Chicago a few years earlier.

At any rate, she submitted her article to the editorial board of the *The Psychological Review*, presenting her experiments and the conclusions thereof. The text was published in the November issue. Wyczółkowska reported:

In the winter of 1907–8 [sic] I was enabled to pursue in the psychological laboratory of the University of Chicago certain experiments with graphic methods. Tongue movements were recorded on a revolving cylinder when certain words were thought or said. [...]

¹ A. Wyczółkowska, *Z psychologii mowy*, p. 513.

² J. B. Watson, *Psychology as the behaviorist views it*, p. 174.

Records were obtained of lingual movements (1) when the subject thought of some familiar verse; (2) when he thought about the words 'experimental psychology'; (3) when he heard the same words as in (2); (4) when he remembered a well-known melody with or (4b) without words; (5) when he listened to a sounding fork; (6) when he listened to a patriotic melody under suggestion; (7) when he remembered a melody under (slight) hypnosis.¹

Wyczółkowska supplemented the research results with the opinions of the five persons tested, whose identity she hid behind their initials: *Miss W., Dr. W., Mr. S., Mr. J. & Mr. P.* She particularly emphasized the opinions of the tested person marked as *Dr. W.* Wyczółkowska wrote: *Every person affirmed that when thinking or listening to speech or melody he was aware of tongue movements. Dr. W. says: 'I follow with my tongue the syllables of the words as they are spoken.'*² In another place, Wyczółkowska stated:

Considering the strict connections of both [i.e. speech and thinking] with the tongue also, we more easily understand why some persons attest that they hear somewhere the words while thinking, or feel a kind of vibrating motion at the end of the tongue or at its back and side when listening to the same words or tones. Mr. J. hearing the words 'experimental psychology' says, 'I feel strong impulses at the back of the tongue; my tongue has the tendency to move forward.' Again Mr. S. says, listening to a melody, 'I feel more movements at the back of the tongue.' And Dr. W., 'There is a feeling of rhythm – a wave motion – as I successively visualize the different parts of the two words. I feel movements on the end, often on the basis of the tongue.' This functional connection of the nerves supplying the tongue with the ear is probably of importance in the assimilation of the speech heard.³

The initials *Dr. W.* present the opinions of John Watson, who was one of the test subjects participating in the experiments. Wyczółkowska revealed it over ten years later in her last book, published in Chicago, in Polish⁴. It summarizes her research and theories in the field of internal mechanisms accompanying the cognitive processes. In the introduction to her work, Wyczółkowska describes the circumstances of her old research:

¹ A. Wyczółkowska, *Theoretical and experimental studies ...*, pp. 453–454.

² A. Wyczółkowska, *Theoretical and experimental studies ...*, p. 454.

³ A. Wyczółkowska, *Theoretical and experimental studies ...*, pp. 457–458.

⁴ See A. Wyczółkowska, *Biologiczne wyjaśnienia mowy i myśli.*

Being kindly offered a place and devices in the psychological laboratory in Chicago, during the time of professor Angell, I started those experiments, and published their results in the report for the November 1913 issue of the Psychological Review. Several male and female students of the University of Chicago, and also professor Angell's assistant at that time, James [sic] Watson [participated in them].¹

Several pages later she wrote:

In the end of this foreword I will allow myself to point your attention to one detail, namely the fact that whoever specializes in psychology, after reading my book, may be convinced that it mimics the well-known American professor and psychologist Watson. However, the nature of the connection of the present book with works by Mr. W. is completely different. When I started my respective experiments in Chicago, to prove the biological origin of speech and thinking, Mr. W. was the assistant of professor Angell, and his original works concentrated in the field of animal psyche. [...] Watson took part in my experiments that I reported in the 1913 Psychological Review. In the same year, Dr. Watson published an interesting work on animal psychology, where he speaks very warmly about my experiments concerning speech and annexes several graphical figures that illustrate my theory [...]. It was not until 1919 that the very same professor Watson published his psychology, for the first time researching not animal, but human psychology, adopting speech as a biological phenomenon as almost the central point thereof. This was the first time a chapter devoted to speech was included in a textbook of psychology.²

In a later part of her last book, Wyczółkowska described the research on tongue movements during listening to others speaking or during thinking, and there she quotes her earlier report by Dr. W., at the same time revealing the name of the speaker:

Then I repeated the observations [...] on a specialist in the psychological laboratory in Chicago [...] This is what Dr. Watson, who is currently a professor known in the whole of America and the author of numerous works of the so-called behaviorist psychology, said: 'I follow with my tongue the syllables of the words as they

¹ A. Wyczółkowska, *Biologiczne wyjaśnienia mowy i myśli*, p. 11.

² A. Wyczółkowska, *Biologiczne wyjaśnienia mowy i myśli*, pp. 14–15.

*are spoken' adding that these are actually not movements but tendencies to move his tongue.*¹

4. A brief history of further research on speech mechanisms: Watson, Wyczółkowska, Lashley, and Thorson

The article published by Wyczółkowska in the November *Psychological Review* of 1913 was mentioned by Watson in his book from 1914². Watson referred to the results of Wyczółkowska's research in chapter X (*Man and Beast*). He lists just four works in the bibliographic section of this chapter, including those by H. S. Jennings, C. H. Judd, L. Witmer, and Wyczółkowska. It cannot go unnoticed that the publication by Wyczółkowska is the classic paper on which Watson based his thesis of the possibility of performing objective measurements of processes occurring in speech organs of humans during thinking and listening, even when he had some reservations about those processes. He expressed those doubts in the following way:

*Anna Wyczoikowska [sic!] in her work on the speech mechanisms states that when a subject was told to think of a word or sentence, there followed a definite movement of the tongue, and that sounding the word or sentence within the range of the subject also produced a tongue movement. Unfortunately, her work stops far short of showing what we believe exists.*³

And his statement continues:

*As stated above, Madam Wyczoikowska shows one method which, imperfect as it is, presents some of the things which we believe to be true in every case of thought. Even that unsatisfactory method can be refined and made to give facts which will either support the argument here presented or else show its unsoundness. To advance the argument, which we admit is highly speculative, we will suppose that future analysis will enable us ultimately to show that every word, syllable, and letter, whether spoken or thought, produces a characteristic form of response which, when recorded, must be looked at from the same standpoint which we adopt when looking at habits elsewhere.*⁴

One may get the impression that he needed support for his thesis on the possibility of objective examination of the internal mechanisms of speech and thinking, but in no case would he admit the fact that Wyczółkowska proved this

¹ A. Wyczółkowska, *Biologiczne wyjaśnienia mowy i myśli*, p. 80.

² See J. B. Watson, *Behavior. An Introduction to Comparative Psychology*.

³ J. B. Watson, *Behavior. An Introduction to Comparative Psychology*, p. 325.

⁴ J. B. Watson, *Behavior. An Introduction to Comparative Psychology*, pp. 327–328.

possibility, especially that he could be inspired by her research. It looks as if the criticism of Wyczółkowska's work freed him from the necessity of further reference to her article, and thus the name of Wyczółkowska does not appear in Watson's canonical work *Psychology from the Standpoint of a Behaviorist* (1919). As we see Watson criticized Wyczółkowska for her research being too superficial and based on an imperfect method. However it is worth noting that he did not offer a solution to this problem¹. The next text by Watson (1920) concerning the relationship of thinking and language mechanisms also fails to mention her research. He states there:

*Some unpublished results of experiments by my colleague, Dr. Lashley, begin to approach a scientific proof that essentially the same type of responses goes on in implicit thinking as goes on in more explicit types of verbal response. With a delicate apparatus which recorded the tongue movements in two dimensions, he was able to show that the overt but whispered repetition of a sentence produced a tracing on the smoked drum which was wholly similar except for amplitude to that obtained when he told the subject to think the same thing without making overt movements. He was able to verify this again and again.*²

We do not know why Watson preferred to justify his theses with the unpublished results of rather vague experiments by his friend, Karl Lashley³. This gambit was noticed and commented on by Arnold Pick, a leader of one of the two European schools of neuropathology. In his article on verbal formulations that accompany movements and actions, he referred to research by Wyczółkowska in the context of Watson's theory. Pick wrote: *In the work by Watson I found information pertaining to Lashley's research that was not yet published, and which seems to confirm these [conclusions] of Wyczółkowska.*⁴ He had no doubt of Wyczółkowska's priority in the research of the subject, and also believed that the unpublished results of research by Lashley did not bring anything new to

¹ R. D. Tweney, *Reflections on the history ...*, p. 92, writes that Watson quoted *the only relevant study* [i.e. the Wyczółkowska's study] *available to him in 1914* and that Watson believes that *the [Wyczółkowska's] study established nothing*. It is difficult to agree with such an assessment. Furthermore, Tweney puts forward the hypothesis that *Watson, possibly as a result of his departure from the academic world in 1921, never developed an experimental approach to language*. But in 1925 Watson published the book *Behaviorism*; he had enough time to prepare even a theoretical plan for such research.

² J. B. Watson, *Is thinking merely the action of language mechanisms?*, p. 96.

³ In his biography of Lashley, Frank A. Beach, *Karl Spencer Lashley 1890–1958*, does not recall research of that type in this period of time. Furthermore, he writes, p. 171: *In the summer of 1914, he [Lashley] and Watson carried on field experiments on the behavior of sea birds [...] That same year, Lashley carried out experiments on the acquisition of motor skills in human subjects, color vision in birds, and conditioning of the salivary reflex*. It is worth noting that in his book *Behavior. An Introduction to Comparative Psychology*, p. vi, Watson thanked K. Lashley for *helping in the actual preparation of the chapters on the origin of instincts and the fixation of arcs in habits* and that he only quotes Lashley's research of Amazon parrots, rats, Indian game bantams, and additional unspecified observations of mammals.

⁴ A. Pick, *Des formulations verbales accompagnant les mouvements et les actions*, p. 893.

this subject. It is worth stressing that Pick not only was familiar with the article by Wyczółkowska published in 1913 by the *Psychological Review*, but also had read the abstract of her 1907 paper¹. No publication by Lashley is known that presents the results of research mentioned by Watson². In *The behavioristic interpretation of consciousness* published in 1923, Lashley does not mention having conducted such experiments³. When later writing about tongue movements during thinking⁴, he cited the article by Agnes M. Thorson (from 1925), discussed below. And when in 1951, he was considering the issue of internal and overt speech, Lashley stated: *Watson interpreted internal speech as inaudible movements of the vocal organs [...]*⁵. That is, Lashley attributed to Watson an insight which Watson had previously attributed to Lashley.

It seems that Lashley's input into research of *internal speech* was different from what Watson announced. He later encouraged Agnes M. Thorson, a doctoral student at the University of Minnesota, to verify the existing experimental results concerning the relation of tongue movements to internal speech. Thorson wrote in her research report: *I wish to acknowledge to Dr. K. S. Lashley for the suggestion of the problem, construction of the apparatus, and for his direction and supervision of the work throughout.*⁶ The article by Thorson contains surprising inconsistencies and errors. The author writes for instance: *Watson ('14) was the first to maintain the identity of thought and language activity.*⁷ Nevertheless, she later describes the experiments by, among others, Curtis⁸, Courten⁹, and Wyczółkowska¹⁰, demonstrating that such a thesis was already formulated by other researchers, at least ten years before Watson. Thorson also committed a surprising chronological mistake, writing:

[...] *Watson uses thought as synonymous with the internal speech or imagery of earlier writers. This fact led to some confusion in the British Symposium ('11 [sic!]), when thinking was interpreted, particularly by Smith and Pear, as meaning the adaptive reactions of the organism, whether involving verbal formulation or not.*¹¹

¹ See A. Pick, *Über das Verhältnis von Echolalie und Nachsprechen ...*

² See J. B. Watson, *Is thinking merely the action of language mechanisms?*, p. 96.

³ See K. S. Lashley, *The behavioristic interpretation of consciousness I* & K. S. Lashley, *The behavioristic interpretation of consciousness II*.

⁴ See K. S. Lashley, *Basic Neural Mechanisms in Behavior*.

⁵ K. S. Lashley, *The Problem of Serial Order in Behavior*, p. 120.

⁶ A. M. Thorson, *The relation of tongue movements to internal speech*, p. 7.

⁷ A. M. Thorson, *The relation of tongue movements to internal speech*, p. 2.

⁸ See H. S. Curtis, *Automatic movements of the larynx*.

⁹ See H. C. Courten, *Involuntary movements of the tongue*.

¹⁰ See A. Wyczółkowska, *Theoretical and experimental studies ...*

¹¹ A. M. Thorson, *The relation of tongue movements to internal speech*, pp. 2–3.

In fact the Symposium to which Watson submitted his paper was held in 1920. Readers of Thorson's article may have the impression that it aims at stressing the primary role of Watson and Lashley in the debate on the phenomenon of *internal speech*. The plan of the experiment conducted by Thorson included elements that clearly referred to the procedure developed by Wyczółkowska. For example Thorson, as Wyczółkowska previously did, uses the term *experimental psychology* as the phrase repeated by test subjects in internal or overt speech. Thorson also used *a very difficult passage in Polish* in her procedure¹. Thus we have yet another proof that the experiment by Wyczółkowska was crucial for research on internal speech and thinking and constituted as a point of reference.

The results obtained by Thorson in her research led her to conclusions that were different from those of her predecessors. Thorson wrote:

*The suggestion from this work [i.e. The relation of tongue movements to internal speech] is, then, that the overt movements of the tongue which are observed during internal speech ought to be interpreted as the mere chance result of neural irradiation, rather than as specific elements in the thought processes. In this respect they resemble drumming with the fingers, facial contortions, tics, and the like, which appear in individuals during emotional stress.*²

The conclusions made by Thorson were not accepted by other researchers³. Even Watson himself referred to them in a critical manner, writing: *Recently Agnes Thorson has found that tongue movements are not universally present in internal speech*⁴; he also presented his doubts in a footnote to this sentence:

Her experiments are very inconclusive. Tongue movements were recorded by a compound system of delicate levers. Her setup could probably be depended upon for positive results, but the method was too inexact to serve as a basis for negative conclusions. No instrument less sensitive than the string galvanometer can be depended upon for negative results. Her saying that because she could find by the use of this method no correlation between tongue movements and internal speech, therefore, 'this leaves only the hypothesis that

¹ Thorson did not explain why she chose a quote in Polish and not any other language. One may wonder about the reason but the inspiration here is obvious. She wanted to make her research more similar to Wyczółkowska's experiment or she tried to maintain similar conditions. The sentence as quoted by Thorson runs thus: *Palacy! Kasciuszko i pulaski walczyli za walnosc Polski i innych narodow! dd'zmy w ich slady! Hej na boj z wrogum odwucznyim Polski i walmas ci!* (whereas the exact text, taken from a patriotic placard, reads thus: *Polacy! Kościuszko i Pułaski walczyli za wolność Polski i innych narodów! Idźmy w ich ślady! Hej na bój z wrogiem odwiecznym Polski i wolności!*).

² A. M. Thorson, *The relation of tongue movements to internal speech*, p. 26.

³ See L. W. Max, *An experimental study of the motor theory of consciousness*.

⁴ J. B. Watson, *Behaviorism*, p. 192.

*the activities are intra-neural, and do not necessarily involve complete motor expression at each stage of the process' is in need of modification.*¹

Watson's criticism of the conclusions by Thorson proves that he rejected any negation of the possibility of objective examination of internal mental states. He believed that finding proof of this possibility was a matter of measures: perhaps a modification of the procedure and the introduction of new recording devices. Therefore, one may ask again why Watson first omitted Wyczółkowska in his *Behaviorist Manifesto*, to later only mention her research critically, and then never again to return to the subject matter, although her research supported his views to a certain extent.

The explanation may be in line with what Wyczółkowska suggested herself in her last book. She believed that the convergence between her research and certain assumptions of behaviourism was not a coincidence. If she was right in her supposition, then this situation can be explained by assuming that Watson did not want to admit being inspired by Wyczółkowska's research. We can only speculate as to why he did not want to do it. First of all, Wyczółkowska's study confirmed only the general existence of the internal speech mechanism. It could not be used to ascertain that the same words conceived or heard corresponded to some characteristic curves caused by the movement of the tongue. Perhaps Watson believed that kind of accurate research results would better confirm his theory. He might have believed that Wyczółkowska's results actually did not go far enough to support his theory. Other reasons are even more speculative. Why should he admit the fact that in the formulation of theory, he got help via the experience he gained from the research in which he had participated a few years earlier? Watson may have not wanted to do so because he probably was committed to participate in Wyczółkowska's research – at that time this was the principle of the psychological laboratory's work in which the investigators were, if need arose, the subjects – and for this reason he retained unpleasant memories. In his autobiography Watson wrote: *I hated to serve as a subject.*² Next Wyczółkowska was older than he, wealthy, and a foreigner. Because of these differences, their contact could have been strictly formal. There is no evidence that this acquaintance involved friendly relations or that it was later continued. In the period when Watson published his first texts on behaviourism, Wyczółkowska was not associated with any university, she did not follow the path of an academic career, and her further fate was probably unknown to him. He may have thought that she returned permanently to Europe. He did not have to be afraid that she would ask him to emphasize her intellectual contribution to forming the basis for the new theory. But perhaps the explanation is more prosaic: Watson had no intention of sharing the authorship of the behaviourist theory with anyone. It was not in his interest to let anyone suspect that one or

¹ J. B. Watson, *Behaviorism*, p. 192.

² J. B. Watson, *John Broadus Watson*, p. 276.

another element of his theory was inspired by the conclusions of other psychologists' research.

5. Reception of the article by Wyczółkowska on the mechanisms of speech: recognized input in the study of the topic and unnoticed inspiration of behaviourism

From 1914 to 2016 Wyczółkowska's article *Theoretical and experimental studies in the mechanism of speech* was cited circa 50 times. This article was also read by one of the most prominent language philosophers and the future Nobel Prizewinner, Bertrand Russell. The issue of *The Psychological Review* reached his hands in 1918 while he was serving a sentence of six months in Brixton Prison. Russell recorded the titles of interesting articles in his handwritten list entitled *Philosophical books read in prison*¹. Arthur Bills included *Wyczółkowska's* [sic!] *Experiment* in his chapter on abstract thinking in his work². What is more, in 1939 Wyczółkowska's article was noted in the *Bibliography of Speech Education*, which was a guide for teachers and students³. This bibliography forms a summary of research in the field of speech that concluded the output in this field prior to the outbreak of the Second World War. The majority of works listed there are now mostly forgotten. Instead, the article by Wyczółkowska belongs to the few items listed in that bibliography that are still read today⁴. It was quoted for example by Charles E. Osgood, one of the most frequently cited scholars in psychology, in one of his thirteen most important scientific works⁵. Frank J. McGuigan reprinted Wyczółkowska's article in his anthology of the most prominent thinking studies⁶. What is significant for the evaluation of the contribution brought to the understanding of thinking and speech by Wyczółkowska is how he commented on:

*In this often-cited article, Wyczółkowska [sic!] anticipates a number of important later developments in psychology; of especial note here is her statement of a motor theory of speech perception, currently the focus of much research. Furthermore, she suggests why a person might, at least in part, reproduce, anatomically and physiologically, words that are spoken to him.*⁷

In conclusion, it must be said that Wyczółkowska was one of the pioneers of early 20th century psychology. Her name (in distorted form) appears in works

¹ See B. Russell, *The Philosophy of Logical Atomism ...*, p. 319 & p. 328.

² See A. G. Bills, *General Experimental Psychology*.

³ See L. Thonssen, E. Fatherson & D. Thonssen, *Bibliography of Speech Education*.

⁴ See N. A. Miller, *Musical listening and kinesthesia: Is there an audio-vocal tuning system?*

⁵ See C. E. Osgood, *The nature and measurement of meaning* & C. E. Osgood & O. C. S. Tzeng (eds.), *Language, meaning, and culture*.

⁶ See F. J. McGuigan, *Thinking: Studies of Covert Language Processes*.

⁷ F. J. McGuigan, *Thinking: Studies of Covert Language Processes*, p. 42.

on the history of behaviourism, albeit, usually only in the references¹. The scientific output of Wyczółkowska and her social activity deserve greater attention, as her biography shows the difficult path that women had to follow at the turn of the century to be recognized in academic society in the Central Europe. Although scientific research and participation in activities for women's rights formed the core of her life, she was never credited adequately for her contributions to psychology².

The supposition supported in this paper that the research by Wyczółkowska influenced the evolution of Watson's scientific interests was suggested a long time ago. Several researchers intuitively noticed this connection. However, Wyczółkowska's and Watson's views on the connections between their work were extremely divergent. Wyczółkowska was convinced that Watson refocused his interests and formulated some theses of behaviourism theory through being inspired by participating in her research. She also believed that the behaviourism resembled her psychological views. Watson stated that he held Wyczółkowska's experiments as being unsatisfactory, he never mentioned his participation in her studies, and he generated the false statement that the thesis of the internal speech and the thought mechanisms was drawn from another researcher. Despite this, the history of Watson's contact with Wyczółkowska confirms what Aaron A. Roback has already written a long time ago, that *it is sufficient to show that Watson has not discovered America; and even his theory of thought as implicit behavior via sublaryngeal movement was anticipated [...]*³.

More recently Robert H. Wozniak stated: *the rise of behaviorism is often portrayed as a revolution in method, and in many ways it was*⁴. This revolution was not only the work of Watson. The procedure of studying *thinking and sublaryngeal movement*, which he encountered during his experiment with Wyczółkowska, is one example of these methods. It was previously unknown to him. It is highly probable that this moment in his professional life had a major role in the development of behaviourist theory as it was formulated by Watson. Although he considered Wyczółkowska's work methodologically useless, it should be remembered that new theories are most often built on the criticism of a prior research. The question as to how important was the role of Watson's participation in Wyczółkowska's research in the emergence of behaviourism remains open: was it really the starting point for his change of interest in animal

¹ The surname of Wyczółkowska is distorted in the English literature as: Wyczoikowska (or Wyczoikowski in the masculine form), Wycziokowska, Wyczotkowska, Wyccolkowska, Wyczockowska, Wyczyikowska, Wyczoikowska, Wyzoikowska, Wiczoikowska, Vicholkovska, Vicholkovskaya, Vicholshovska, Vicholskovska. See e.g. J. A. Mills, *Control. A history of behavioral psychology* & R. D. Tweney, *Whatever happened to the brass and glass?*

² There is no place in this paper to develop this subject in a broader context. Nevertheless, the life and scientific work of Anna Wyczółkowska is a perfect illustration of the problems mentioned by E. G. Boring, *The woman problem*. Her story also confirms the thesis by L. Furumoto & E. Scarborough, *Placing women in the history of psychology*, that the omission of scientific achievements of women largely impoverishes the history of psychology and distorts the understanding of its development.

³ A. A. Roback, *A History of American Psychology*, p. 270.

⁴ R. H. Wozniak, *Behaviorism*, p. 199.

psychology towards general behaviour theory or did it serve as just one of the reasons to exclude introspection from studies devoted to higher mental activities? Anyway, one can hardly overlook the convergence between Wyczółkowska's studies and the theory which served as a foundation for Watson's behaviourism*.

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