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Journal of Neurology 262 (6) 2015 : 1599–1600

DOI: *10.1007/s00415-015-7743-2*

Pioneers in Neurology

Ivan Petrovich Pavlov (1849–1936)

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Most papers studying emotional learning and emotion-related disorders are mainly based on the experiments per-formed by the famous Russian physiologist Ivan Pavlov more than a century ago. Nowadays, we reflexively link his name to a dinging bell and a drooling dog, although he never trained a dog to salivate to the sound of a bell [8]. Our brains have been conditioned with the myth, as stated by George Johnson in The New York Times (December, 2014). However, this is just a very small fraction of Pavlov's researches and his life.

Ivan Petrovich Pavlov was born on September 14, 1849 in Ryazan, about 200 km south-east of Moscow. His father, Peter Dmitrievich Pavlov, was the village priest so Ivan was first educated at the Ryazan Ecclesiastical High School and then at the Ryazan Ecclesiastical Seminary, where he planned to pursue a career in the priesthood [5]. As a seminarian, he only took one course in psychology. However, he was greatly influenced by the new theories of Charles Darwin published in On the Origin of Species (1859), and by Ivan Mikhailovich Sechenov's materialist Reflexes of the Brain (1863), whom Pavlov himself later named as ''The Father of Russian physiology'' [2].

In 1870, Pavlov abandoned his religious career and entered the University of St. Petersburg, where he studied in the laboratory of Il'ya Fadeevich Tsion, who taught him Claude Bernard's style of physiology and surgical skills [8]. Pavlov later referred to Bernard as the ''true inspiration'' in physiology [5]. Five years later, he completed his course with an outstanding record and received the degree of Candidate of Natural Sciences. On June 13, 1880, he proposed to Seraphima Vasilievna Karchevskaya, a very religious woman, and they married in 1881. In 1883 Pavlov presented his doctoral thesis on the subject of ''The centrifugal nerves of the heart''. In 1890, he was appointed as the chair of Pharmacology at the Military-Medical Academy in St. Petersburg, and in 1895 the chair of Physiology at the Imperial Medical Academy, which he held till 1925 [5, 8].

Thanks to his great ability as a surgeon, Pavlov started studying the digestive system in dogs by performing chronic implants of fistulas in the stomach, by which he was able to show with extreme clarity that the nervous system plays a dominant role in the regulation of the di-gestive process [4]. Experiments on digestion led to the development of the first experimental model of learning, in which a neutral stimulus acquires the capacity to evoke a specific response further to repeated pairing with another stimulus that evokes the response. During chronic experiments, it was noticed that dogs drooled as soon as they saw the white lab coats of people feeding them, and Pavlov started to investigate this 'psychic secretion', as he called it [4, 8]. Later on, he chose to replace 'psychic secretion' with 'uslovnyi refleks', translated as 'conditioned reflex', although its original meaning for Pavlov is better translated as 'condition al reflex' [7]. The 'hallowed by use' term conditioned reflex was then a translation error from Russian, although it is accepted and retained in the psychological literature [3,8]. Since dogs naturally drooled when fed (in Pavlov's word, an unconditional reflex) they had learned to associate the lab coats (the conditional stimulus) to feeding.

The presentation by Pavlov and Tolochinov at the Congress of Physicians and Natural Scientists of Northern Europe held at Helsingfors in 1902 was published in the reports of the congress in 1903, and for the first time, the terms conditional and unconditional reflexes were used [5]. It was now possible to investigate psychic activity objectively. 'In recognition of his work on the physiology of digestion, through which knowledge on vital aspects of the subject has been transformed and enlarged' he was awarded, in 1904, the Nobel Prize in Physiology or Medicine, the first in the area of neuroscience.

Less known is his fundamental work on personality and its extension to psychiatry; indeed, along with the definition of classical conditioning, Pavlov identified other processes linked to it: generalization, discrimination and extinction. Nowadays, generalization and discrimination are essential aspects in the etiology of anxiety disorders, and principles he identified for extinction provide the basis of the modern therapies for emotional disorders, such as post-traumatic stress disorder.

Pavlov used to spend 9 months of each year completely devoting himself to scientific work and then for three summer months, he enjoyed gardening, art, music, and philosophy in his family's summer residence, almost forgetting science [8]. In addition, he was a citizen of his time, leading an incessant battle against the determined will of the authorities for his freedom of belief, for human dignity and true democracy [9]. Pavlov was not described as a pleasant person and elevated skepticism in science to the status of virtue, to the point of being considered dogmatic, petty, and unforgiving of people having even small differences of interpretation with him [1, 8]. Moreover, he cared little for material things and used to spend most of his money on his researches [6] so that he lived most of his young life in poverty. However, from the 1890s onward, he lived a comfortable 'upper middle class' lifestyle, with a large apartment, a summer home, and from the 1920s, a huge art collection [8]. Pavlov used to be methodical in his personal life as during an experiment: he was said to arise at 6 a.m. and walk the three miles to the laboratory, had dinner at 6 p.m., tea at 9.30 p.m. and then worked until bedtime at 1 a.m. However, during free time, he liked to play gorodki, his favorite game.

In the organization of work, Pavlov was a longsighted scientist. He developed a citadel of science and managed a large group of coworkers, with many women. Moreover, he used to have periodic meetings and discussions, enabling him to constantly monitor research progress [8].

At the age of 86, Pavlov had the honor to preside over the XV International Congress of Physiological Sciences in St. Petersburg and Moscow in August 1935 (Fig. 1).

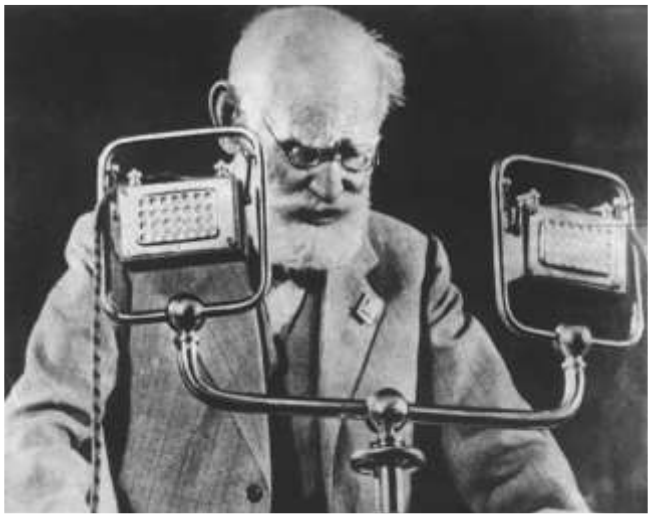

Figure 1. Ivan Pavlov gives his opening speech at the XV International Congress in Physiology (Leningrad, Moscow, 1935)

He died of pneumonia in Leningrad on February 27, 1936, at the age of 86. He was given a grandiose funeral and his laboratory and office were preserved as a museum in his honor.

Acknowledgments

The authors wish to thank professor Daniel P. Todes (The Johns Hopkins University) for his comments on the present manuscript and Professor Michail O. Samoilov (Pavlov Institute of Physiology) for information and material on I. P. Pavlov.

Conflicts of interest

The corresponding authors state that there is no conflict of interest.

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