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THE PAVLOV-YERKES CONNECTION: WHAT WAS ITS ORIGIN?

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Historians of psychology traditionally acknowledge Robert Mearns Yerkes as responsible for introducing the work of Russian physiologist Ivan Pavlov to American psychologists. The introduction occurred in a 1909 *Psychological Bulletin* paper coauthored with Harvard graduate student, Serguis Morgulis. Yet how Yerkes, who did not read Russian and who never personally used Pavlov's conditioning paradigm, came to know and appreciate Pavlov's endeavors is unclear. This paper examines how Yerkes became acquainted with salivary conditioning studies and suggests a reason why the 1909 paper was actually written.

Although Robert Yerkes receives credit for introducing conditioned reflex methodology to American psychologists (Yerkes & Morgulis, 1909), Ivan Petrovich Pavlov's investigations of gastric secretions were well known in America at the beginning of this century (see Pappenheimer, 1981). A 1901 note in *Science* states that the German publication of Pavlov's digestion studies—studies that were to lead to his 1904 Nobel Prize—was one of the most exciting books in contemporary physiology (Mendel, 1901). Dewsbury (1990) notes two derisive references to Pavlov's work in early-century issues of *Life* magazine (Staff, 1902; Staff, 1908). In 1902 the English publication of Pavlov's classic account of digestive gland function appeared (Pavlov, 1902), but the Russian physiologist had by then turned his attention to "psychic secretions."¹

For several years Pavlov had been intrigued by a phenomenon he termed psychic secretion, that is, the excitation of the gastric glands during sham feeding—a phenomenon that would conceptually evolve

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¹Windholz (1983) reports that Pavlov first described his encounters with psychic secretions in 1899 to an assembly of Russian physicians in St. Petersburg.

into the conditioned reflex of present day psychology textbooks.² During the initial years of the century, he directed a pair of studies in an attempt to determine whether psychic secretions required a psychological or a physiological explanation (see Pavlov, 1928). By 1903, in an address made during the Madrid meeting of the International Congress of Medicine, Pavlov was convinced only a physiological explanation was necessary (Pavlov, 1928). The first American discussion of the conditioned reflex to appear in print was the transcript of a Huxley Lecture that Pavlov delivered during October 1906 at Charing-Cross Hospital in England. The lecture was printed in the November 16th, 1906, issue of *Science* (Pavlov, 1906) and was cited in Yerkes and Morgulis's bibliographic appendix.

Windholz (1983) comments that earliest known correspondence between Pavlov and Yerkes is Yerkes's November 20th, 1908 request for reprints from Pavlov's laboratory. The earliest archival correspondence between the two men extant in Yale University's Yerkes Papers is a 1908 note from Pavlov stating that all of his conditioned reflex work to date had been published in Russian (Pavlov, 1908). The Yerkes archival collection contains evidence of a flurry of letters exchanged in early 1909, though only Pavlov's responses survive. In a March 1909 letter,³ Pavlov acknowledged receipt of reprints from Yerkes and firmly declined an offer to prepare a conditioned-reflex article for Yerkes's forthcoming *Journal of Animal Behavior* (Pavlov, 1909a); in April, Pavlov returned a corrected manuscript—perhaps the Yerkes and Morgulis manuscript (Pavlov, 1909b); and again in April, Pavlov acknowledged the receipt of reprints and a description of modifications in Yerkes's Harvard laboratory (Pavlov, 1909c). Pavlov wrote all of these letters in terse, formal German and addressed them to "Honored Colleague," hardly a salutation suggesting familiarity. Given the limited nature of the early correspondence and Yerkes's admission he did not meet Pavlov face-to-face until 1923 (R. G. Yerkes, n.d.), there is little reason to suspect the Pavlov-Yerkes connection was strong and well established for any extended period prior to the Yerkes and Morgulis paper.

²Goodwin (1991) has detailed a textbook misportrayal rooted in the Yerkes and Morgulis paper and perpetuated to this day. The original paper contained two figures: a sketch of a harnessed dog waiting to salivate following stimulus presentation and a less experimentally descriptive depiction of dog with a graduated cylinder attached to a salivary fistula. The former figure, usually attributed to Pavlov, is the familiar paradigm exemplar found in general psychology textbook discussions of classical conditioning. However, the source of this figure was not Pavlov but G. F. Nicolai, a Berlin investigator. Yerkes and Morgulis provided correct textual attribution for their figures but failed to provide figure captions. Goodwin credits the sustained misattribution of this figure to the overreliance of textbook writers on secondary sources.

³I gratefully thank Paula S. Leming for translating the early Pavlov letters. Interestingly, Professor Leming notes that the German of the March 1909 letter suggests a hint of irritation, as if Yerkes had been pressing his request a bit too hard.

With scant, but available, published accounts of the conditioned reflex and with Yerkes's limited interaction with Pavlov, Morgulis's role in the development of the 1909 paper warrants scrutiny. Serguis Morgulis was born in Russia on August 6th, 1885.⁴ He entered the United States in 1904 and became an American citizen in 1910. A student of zoology, Morgulis earned his masters degree from Columbia University in 1907 and his doctorate from Harvard in 1910. He went on to a successful career in physiology (E. R. Hilgard, personal communication, June 26, 1991), holding positions at the Columbia College of Physicians and Surgeons, Creighton University, and the University of Nebraska. In a 1937 letter, Yerkes told Ernest R. Hilgard that Morgulis's contribution to the 1909 paper included translation and abstraction; that Morgulis's participation was "merely incidental" to his personal scientific interests; and that Yerkes initiated the effort to draw attention to Pavlov's work (Yerkes, 1937). Five years after publication of the 1909 paper, Morgulis (1914d) wrote a second review of Pavlov's labors.⁵ The archival record surrounding this paper supports Yerkes's claim to have enlisted Morgulis's help on the 1909 paper: Morgulis's letters to Yerkes clearly indicate that Yerkes asked Morgulis to write the 1914 article (Morgulis, 1914a, 1914b) and that Yerkes procured the Russian dissertations Morgulis requested (Morgulis, 1914c).

A potential avenue of introduction between Morgulis and Yerkes might be inferred from a footnote to a paper that Morgulis wrote in 1910 in which George Howard Parker is thanked for his support. Parker was a popular teacher in Harvard's zoology department, a teacher renowned for simultaneously diagramming organisms on the blackboard with both the right and the left hand (E. R. Hilgard, personal communication, June 26, 1991). Yerkes had also sat under Parker's tutelage while a Harvard graduate student; in fact, Parker recommended to Yerkes one of Yerkes's earliest lines of research: the structure and function of the semicircular canals (Yerkes, 1950). While the research for the Yerkes and Morgulis paper was in progress, Morgulis was studying zoology at Harvard and Parker was investigating reflexes in lower animals (Benison, Barger, & Wolfe, 1987). Interestingly, Pavlov (1928), while reminiscing about research investigating the reflex as behavioral substrate, lists Thorndike, Watson, Yerkes, and Parker as American innovators of reflex methodology.

The early accounts of Pavlov's work in English, the contact between Pavlov and Yerkes, and the influence of Morgulis and Parker no doubt impinged upon Yerkes and contributed to his desire to initiate the 1909 paper. However, I believe one must look to another of Parker's students—an individual with whom Yerkes often socialized—to discern the strongest influence directing Yerkes to the conditioned reflex.

⁴I am indebted to Dr. Donald A. Dewsbury for the Morgulis biographical information.

⁵"Pavlov's labors" would more accurately be described as "the work of Pavlov and his associates." For a discussion of Pavlov and his personnel, see Windholz (1990).

Harvard physiologist Walter Bradford Cannon. Cannon's connection with the Harvard zoologists, particularly with Parker, was longstanding. In 1895, while in his senior year as a Harvard undergraduate, Cannon, who excelled in zoology, was asked by Charles Davenport, then head of zoology at Harvard, to teach the intro-zoo class at Radcliffe that year (Benison et al., 1987). (Three weeks later, Cannon described to his diary an enjoyable evening with Parker at the symphony, Benison et al., 1987). While in his last year of medical school, 1899, Cannon accepted an appointment as instructor in zoology from Harvard president Charles W. Eliot. After earning his MD, Cannon joined Harvard's physiology department, where he remained until his retirement in 1942. Cannon's biographers (Benison et al., 1987) depict his relationship with Parker as honest, lasting, and personal. In 1906, when Parker was promoted to full professor, George and Walter celebrated over dinner in the Cannon home (Benison et al., 1987).

Cannon's friendship with Yerkes was also genuine. Yerkes earned his PhD from Harvard in 1902, two years after Cannon's medical degree. Following graduation, Yerkes joined Harvard's Division of Philosophy, which at that time included psychology. Cannon and Yerkes moved in the same circle of friends, roughly defined by a group called the Wight Club, which included such individuals as Ralph Barton Perry and Edwin Bissell Holt (Benison et al., 1987; Hilgard, 1987; Yerkes, 1950). Holt had formed the group in 1903 to provide an informal opportunity for members to share their research and have their friends critique it. The interaction between Cannon and Yerkes was not limited to business. Yerkes once confided to his diary that Walter and Cornelia Cannon "are the most sensible, common-sense-place [sic], cordial, clever, sincerely friendly folk that I know in Cambridge" (Yerkes, 1903b). The friendship between the Cannons and Robert and Ada Yerkes continued to grow deeper over the decades (Yerkes, 1950), to which their voluminous correspondence and their adjacent summer homes in New Hampshire attest (cf. Hilgard, 1987; also, the Yerkes Papers). Once, when Cornelia thought Walter had committed suicide, she asked Robert to search the Charles River until the wee hours of the morning. Unknown to them, Walter—locked out of his home and unable to contact Cornelia—had spent the night with friends (Benison et al., 1987).

Yerkes shared with his diary the wonder of viewing the "workings" of a cat's digestive system via an x-ray preparation in Cannon's laboratory (Yerkes, 1903c; cf. Wight, 1991b). Digestion was Cannon's specialty, and therein lies Cannon's early connection to Pavlov. As he relates in a 1936 necrology, Cannon (1936) was familiar with Pavlov's work as early as the 1890s. Cannon's investigation of digestion began during his first semester of medical school when he decided he needed more instruction than simple classwork, the instruction only independent research could provide. Cannon consulted the head of Harvard's physiology department, Henry Pickering Bowditch, who enthusiastically introduced Cannon to the use of x-rays and the possibility of exploring

the digestive tract. The research program was a success. By 1905, Cannon was wondering how to integrate his data highlighting the mechanics of digestion with Pavlov's data emphasizing gastric secretions (Benison et al., 1987). In 1928, when the American Society for Cultural Relations with Russia wrote Yerkes requesting he give a lecture on Pavlov and his work (Branham, 1928), Yerkes responded that Walter Cannon was "better qualified" to meet the Society's needs (Yerkes, n.d.).

As Cannon's career matured, he vigorously supported Pavlov's scientific endeavors. In 1921 when hardship in the Soviet Union hampered Pavlov's work, Cannon mobilized the American Physiological Society, of which Yerkes was a member, in a drive to raise money to supply the Soviet physiologist with scientific literature published outside the USSR (Cannon, 1921, 1922a; Meigs, 1921; Yerkes, 1921a, 1921b). When Pavlov expressed a desire to publish a volume on his conditioned reflex work in English, he consulted Cannon (Cannon, 1922b), who in turn consulted Yerkes because of Yerkes's experience with the publishing industry (Cannon, 1922b, 1922c, 1923; Yerkes, 1922). Cannon perhaps best expressed the similarity of thought among the three men in a 1916 letter to former Harvard president Charles W. Eliot:

My own work, as you know, has made a bridge between the two subjects [physiology and psychology]. The work of the Russian physiologist, Pawlow . . . has done similar service to Psychology . . . I feel sure that some of the most important advances in science, in coming years, will be made in the borderlands between related sciences and in the integration of related phenomena in different sciences whose limitations have thus far failed to appear because of the limitation of attention and insight. (quoted in Benison et al., 1987, pp. 331-332).⁶

How did Yerkes learn of Pavlov? I propose a confluence with the scientific literature of this century's first decade, Serguis Morgulis, and George Parker all serving as minor tributaries and with Walter Cannon serving as principal concourse.

Perhaps a more interesting question is why did Yerkes write the 1909 paper? The archival record clearly indicates that Yerkes considered Pavlov insufficiently represented in English. Yet given Yerkes's push to see more of Pavlov in print, Yerkes's failure to incorporate the conditioning paradigm into his own research is somewhat curious. Recall that it was John B. Watson who in his 1915 American Psychological Presidential address advocated conditioning—specifically, Pavlov's terminology and Behkterev's focus—as a methodological replacement for introspection (Watson, 1916). Although Yerkes and Pavlov developed a cordial professional

⁶Skinner (1981) observed that Americans initially learned of Pavlov through German publications given that his name is often spelled with "w" rather than "v."

relationship, Yerkes's reasons for writing the 1909 document seem obscure.

Perhaps Yerkes's motives are obscure only if one fails to take into account the academic milieu in which Yerkes found himself prior to enlisting Morgulis and writing the 1909 paper. Working as a comparative psychologist in the Harvard Division of Philosophy under the supervision of Hugo Münsterberg during the first decade of this century was no easy task for Yerkes. Yerkes had been repeatedly passed over for promotion from instructor to assistant professor. In 1908 this failure to recognize Yerkes's academic worth to Harvard came to a head (O'Donnell, 1985), with Yerkes insisting that Münsterberg speak to President Eliot about the matter and share with him the published evidence of Yerkes's productivity. The argument Münsterberg used to secure Yerkes a promotion revolved around an insistence on Harvard's part that Yerkes adjust his lectures to emphasize the educational rather than the biological aspects of psychology (O'Donnell, 1985). Yerkes often expressed confusion over whether he was actually a psychologist or physiologist (e.g., Yerkes, 1903a; see also Buckley, 1989). He preferred a combination of the two, but with a family to support—and with Harvard's lack of support—Yerkes was finding the odds stacked against him. The arrival in 1909 of new Harvard president A. Lawrence Lowell only cemented Yerkes's institutional isolation. Lowell quickly communicated to Yerkes that a change of emphasis was necessary if he wished to advance at Harvard (Yerkes, 1950). In November of 1909, two months after the appearance of the Yerkes and Morgulis paper, Yerkes wrote to E. B. Titchener that he was waffling between remaining a psychologist or "turning from it into physical science forever" (quoted in Buckley, 1989, p. 71). In the same letter, Yerkes further complained that other experimental psychologists were keeping him on the fringe of the discipline.

But Yerkes was a fighter, and in the next two years he published an article (Yerkes, 1910)⁷ and a textbook (Yerkes, 1911) that are thinly disguised apologies both for comparative psychology and for the need for more objective methodologies in the discipline as a whole (Wight, 1991a). The Yerkes and Morgulis (1909) paper is perhaps of this same genre. Consider the authors' stated purpose:

First, to present a body of facts which is of great importance to both physiologists and animal psychologists; and second, to familiarize American investigators with the salivary reflex methods. (p. 257)

A subtle nudge might awaken the sleeping sensitivities of individuals indifferent to animal psychology.

Granted, there exists no archival smoking gun to alleviate all doubt

⁷Pavlov was highly impressed with Yerkes's plea, as expressed in this article, for more objective methodology in psychology and even worked comment on the paper into his lectures (Windholz, 1983).

about the source of Yerkes's familiarity with the conditioned reflex prior to 1909 or about why Yerkes and Morgulis chose to take time to research and write the paper. However, without examining these questions, present day psychologists run the risk of ensconcing another origin myth in the pantheon of great people, great dates, and great events.

For almost a decade, Ivan Pavlov had decried the lack of objective methodology in psychology and advocated physiological explanations of psychological phenomena (see Pavlov, 1928). Walter Cannon was aware of the views from St. Petersburg and must have shared them with his troubled friend and Harvard colleague. Yerkes perhaps saw in Pavlov's research a line of argumentation capable of bolstering the beleaguered position of comparative psychology at Harvard.

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