In an excerpt from his new autobiography, Penn psychology professor Martin Seligman tells the little-known story of the American Psychological Association's annual meeting in 1904, held at Penn. Its reverberations were profound—for Penn psychology professor Edwin Twitmyer and for American psychology.

When William James Got Hungry

By Martin E. P. Seligman

For much of his 50-plus-year career, Martin E. P. Seligman Gr'67, the Zellerbach Family Professor of Psychology and director of Penn's Positive Psychology Center, has been one of the towering figures of psychology. His career took off early with his groundbreaking theory of Learned Helplessness, which grew directly out of his doctoral work at Penn. Along with his academic work—he is among the most cited psychologists in the nation—he served as a transformational president of the American Psychological Association, and played a central role in founding the field of Positive Psychology. He has been at times a controversial figure, befitting a man who decided early on that he had no interest in being boring.

In *The Hope Circuit: A Psychologist's Journey from Helplessness to Optimism* (published in April by PublicAffairs), Seligman tells the story of his life and career—including his youthful days in Albany, his education at Princeton and Penn, and the multifarious roles he has played in his field.

The following excerpt turns on a deceptively quiet moment in the clash between mentalism and behaviorism. Put simply: If William James hadn't been hungry that day, "Twitmyer's Knee" could have been as famous as "Pavlov's Dog."

In the room that housed my desk in graduate school, one of the great fiascos of science had taken place 60 years before: Edwin Burket Twitmyer Gr1902's announcement of his momentous discovery to the psychological world. It was not auspicious that my desk sat exactly there.

On the morning of December 29, 1904, the leading lights of American psychology assembled to listen to each other's papers. The occasion was the 13th annual meeting of the American Psychological Association (APA), held appropriately enough on the West Philadelphia campus of the University of Pennsylvania. Penn was home to the very first department of psychology in America, established in 1887.

Its founders had taken inspiration from Leipzig's Wilhelm Wundt and his brave band of breakaway German-speaking scientists—brave because they sought nothing less than a science of mental states, a science of psychology. College Hall, a Victorian pile of green and brown stone, sat in the center of the few buildings that constituted the University of Pennsylvania. To attend the paper reading, these professors, the men wearing

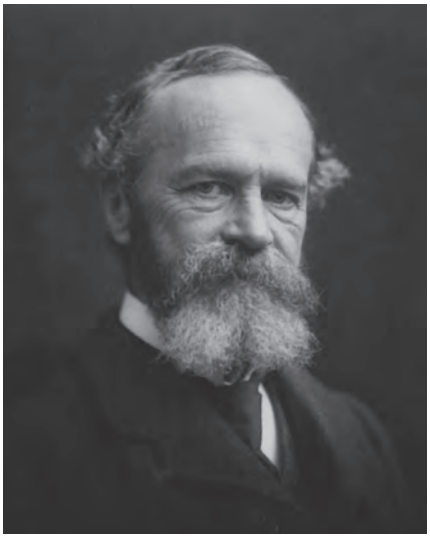
 ILLUSTRATION BY DAVID HOLLENBACH


Pavlov
Twitmyer

heavy dark suits, white shirts with rounded collars, and colorless ties, trudged up the 12 concrete steps and through the heavy double doors. It is noteworthy that the assemblage was not solely male since the next APA president, Mary Whiton Calkins, was among them. They turned right, strode the length of the wide corridor with its 15-foot ceiling, and entered the large classroom.

On the dais sat William James himself, the newly inaugurated president of the APA, holding that post for the second time. James was a founder of American psychology, having established the first American "psychological laboratory" at Harvard in 1875, even while teaching physiology. His was an awe-inspiring presence. Erect and wiry, with striking blue eyes, his light beard now mostly gray, James was an affable and witty conversationalist. Like his dour brother, novelist Henry James, William was quite fragile, having suffered at least two "nervous breakdowns," and he was a prolific but much less fusty a writer than Henry. His acclaimed 1,200- page *Principles of Psychology* was already the classic textbook, and his influential essay "Does Consciousness Exist?" had just come out.

James called the morning session to order, and the reading of papers began. You, my reader, and even I would have found the session dull—our knowledge of what was about to happen notwithstanding—and we would have spent our time gazing out the 12-foot windows onto the green fields. R. S. Woodworth reported a high correlation between the strength of the right hand and the left. Margaret Washburn discoursed on the difference between a "feeling" and a "sensation." Hugo Muensterberg somehow united the truth of arithmetic with the values of morality and religion. Lightner Witmer C1888, director of the psychological clinic of the Penn department, reported on the accuracy of guesses about the heaviness of very similar weights. A polite, low-key discussion lasting about 10 minutes followed each paper.



William James, ca. 1903.

At least one person in the audience was terrifically excited, barely able to contain himself. Thirty-one-year-old Edwin B. Twitmyer was about to report on his 1902 doctoral dissertation. He suspected that he had captured the most fundamental particle of learning.

This was a grand venture with a venerable provenance. David Hume (1711–1776), the founder of "associationism," claimed that we could never observe *cause* directly; rather we could only observe the *contiguity* in time between two events. The red billiard ball strikes the white ball, and the white ball shoots off into the pocket. We infer that the motion of the red ball caused the white ball's motion, but we only ever see an *association* in time. Such associations are the fundamental building blocks of all learning, since for the British empiricists, of whom Hume was the leading light, the mind is but a blank slate that experience writes on. And what does experience write on the blank slate? Only these associations, and so all that we learn, all that we know, is merely the combination of countless pairings.

This became a program for scientific psychology. If science could isolate and measure such associations in the laboratory, science would be able to measure learning objectively and get on its way to unraveling the mysteries of all knowledge. The scientist who discovered how to do this would achieve immortality.

Twitmyer believed he had done it. When the human kneecap is struck—just right—with a rubber hammer, a large kick ensues. This is called the patellar reflex. Reflexes are not learned; they are the nervous system's inevitable and unconscious reaction to a stimulus. Twitmyer, ingeniously, rang a bell half a second before each hammer blow. Sure enough after 150 or more pairings, the bell itself was followed by the kick—even before the hammer blow. This worked for every one of Twitmyer's six subjects.

This should all sound familiar, because in Saint Petersburg at just the same time and for similar reasons, Ivan Petrovich Pavlov was doing essentially the same thing—independently. Pavlov paired the clicking of a metronome with food powder injected into the mouths of dogs and found that the clicks alone came to elicit salivation. Pavlov added an important wrinkle: digestive surgeon that he was—not a psychologist—he extruded the salivary gland of the dog, and so he could count precisely the number of drops of saliva elicited by the clicks, rather than just weighing some mushy food. Pavlov, already renowned for his work on digestion for which he got the Nobel Prize in 1904, trumpeted these results in Madrid in 1903 in his Nobel acceptance speech. Pavlov achieved immortality for discovering this, the "conditional reflex."

Twitmyer did not achieve immortality. For at the close of his paper, James said, "Just in time for lunch. I guess there won't be any discussion of this paper. Let's go eat."

Why didn't Twitmyer get any credit at all for this important discovery? For one thing Twitmyer's 1902 dissertation was privately printed and so inaccessible, while Pavlov—already an international icon—was able to spread the word of his latest discovery in his Nobel acceptance speech. Twitmyer, in contrast, was a

Photo courtesy Houghton Library, Harvard University

newbie and seems to have shyly avoided anything that smacked of self-promotion. For another, American psychologists at this time focused on consciousness, whereas a reflex was merely physical and mechanical, hardly the key that would unlock the mind. But it is also a sad fact that William James was bored and hungry.

Kneecapped, Twitmyer dropped his conditioning work and turned his attention to his wife's specialty, speech defects in children.

Sixty years later this wound to the collective psyche of Penn's proud department still festered, and I could sense it as Professor Francis W. Irwin C'26 G'28 Gr'31 related the Twitmyer story to us. Frank had been at the center of the only psychology coup d'état of the last century. Since Twitmyer's time Penn's department had gotten sleepier and sleepier, and by 1955 it was snoring audibly. As the longtime editor in chief of the prestigious *Journal of Experimental Psychology*, Frank was one of the only faculty members who still had his finger on the pulse of any living science. He persuaded Penn's high administration that a rustling was in order, and the victim of the raid was to be Harvard's psychology department. Two rival tyrants then reigned over Harvard: B. F. (Fred) Skinner, the star of 1950s behaviorism, and S. S. (Smitty) Stevens, the world's leading mathematical psychophysiologist. But chafing under their whip hands were a half dozen brilliant young psychologists. Penn contacted Robert Bush, the political leader of these young Turks, and in one fell swoop Penn offered all of them full professorships. All of them accepted. Nothing like this had ever happened before in psychology; nor has it since. So in 1958 a rejuvenated department under the chairmanship of Bob Bush suddenly appeared at 121 College Hall. Penn became—overnight—the place to be.

Frank told us the Twitmyer story on the very first day of the proseminar, the gruel-

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Edwin Burket Twitmyer, ca. 1925.

ing yearlong, five-day-a-week course in which every single faculty member taught, seriatim, his (pronoun accurate) personal research in detail. Frank was the senior member of the faculty, and he actually knew Twitmyer [who had served on Penn's faculty as professor of psychology and director of the Psychological Laboratory and Clinic until his death in 1943]. Austerely dressed in a threadbare gray suit and gray-blue tie, he looked considerably older than his 60 years—although everyone over 50 looked ancient to me at the time. He chain-smoked and at one point had three cigarettes smoldering—he was every bit as nervous as the 20 graduate students newly arrived at the place to be.

He had every right to be nervous since he was presenting the culmination of his 40 years' work on learning to a hypercritical audience. Young as we were, we were up to date about the very latest in learning theory—trends Frank was deeply skeptical about. He did not believe in stimulus-response-reinforcement theory, which held a monopoly in the field of learning.

Frank came to maturity as this monopoly grew. To appreciate why behaviorism came to exert over the world of psychology a hold so strong that Frank spent his entire career fighting it, let's return to William James's shooing everyone out to lunch.

William James was likely bored by the reflexes of the knee and for good reason. The associationists were thoroughgoing mentalists: an association was the pairing of two mental states: the idea of wooden false teeth evokes an image of the unsmiling George Washington. James believed that mental states—ideas, images, knowledge, attention, and awareness—were the true subjects of psychology. You can bet that James began to gaze out the window soon after the talk started, thinking that this Twit-fellow was irrelevant: No science of mind would ever come from low-level reflexes.

But James did not reckon on behaviorism, the up-and-coming movement that dispensed with mental life altogether on the grounds that only behavior can be reliably measured.

The psychological world listened to Pavlov, if not to Twitmyer, with growing—and then exploding—interest. Through the first decade of the 20th century, discontent was rife in the field. The mentalism that pervaded the 1904 meeting increasingly clashed with the materialism of the harder sciences, spurred on by the remarkable success

Photo courtesy Penn Psychology Department

of Einsteinian physics in the first 20 years of the 20th century. Not only were ideas, sensations, images, and awareness "soul" stuff and science "body" stuff, but, even worse, these mental states were notoriously hard to measure. If two introspecting subjects might disagree about what they saw when light of a given wavelength was flashed—blue, dark blue, reddish purple, or deep purple—what of their even bigger disagreements when introspecting about images and ideas?

Behaviorism was elegant. It sought to rid psychology of the quicksand of mental stuff and to place measurable behavior as the concrete footing that real science requires. A rat turning left or right in a maze was more measurable and more replicable than the sensation of slimy as composed of the sensation of warm plus that of wet. John Broadus Watson ignited the revolution in 1913 at Columbia University.

Psychology, he thought, should be "a purely objective experimental branch of natural science," aiming not to understand the fluff of the mind but to predict and control behavior. Introspection was a muddle, and behavior was the right unit for scientific analysis.

Within two decades, behaviorism had swept away introspection entirely, and its experimental psychologists ascended to the top professorships of American psychology. The science of mind had transformed into the science of behavior, and "learning theory" now sat on the throne.

Learning theory had three basic elements: stimulus, response, and reinforcer. "Stimulus" and "response" were the American derivation of Ivan Pavlov's work, the leading exemplar of good behavioral science. Food was the "unconditioned stimulus" and salivation the "unconditioned response" elicited by the food. The clicking of the metronome became the "conditioned stimulus" when paired with food, and the little bit of salivation that occurred in response was the "conditioned response."

"Reinforcer," the third element of the behaviorist triad, descended from Edward L. Thorndike's work at Columbia Teacher's College. He put cats in "puzzle boxes," in which pulling a string would open a door leading to food and freedom. The cats learned only gradually, not by sudden insight, and Thorndike proposed the "law of effect": associations followed by a "satisfier" are strengthened; those followed by an "annoyer" are weakened. This was solid behavioral work, but Thorndike's language needed purging by the language police.

So, stripped of Thorndike's mentalism, a "reinforcer" was an event that, when made contingent on a response, increased the probability of that response—no need to postulate mental satisfaction or reward. Out of these simple elements, so the program went, the entire edifice of all learning would be constructed. When my parents asked me on one of my visits back to Albany, what I was, I proudly *responded*, "I am a learning theorist."

Frank Irwin would also have said, "I am a learning theorist," although he would have termed this his "action" and not his "response." Frank told us on that first day that stimulus, response, and reinforce were bosh. Instrumental behavior is not governed by blind reinforcement but rather is *intentional*—even in rats. Rats (and certainly people) are cognitive and choose their most highly preferred available outcome. Frank's skepticism resonated with me; that animals might be cognitive was on my mind when I later undertook my work on learned helplessness.

So, a central premise of psychology as I first knew it was that the discipline could safely ignore thinking and consciousness, could ignore all of "mind." For the behaviorists, impeccable measurement topped everything. Behavior could be known with certainty, but mind could not, so mind was outside science. And it was not just the behaviorists who eschewed mind. For the Freudians, it was no accident that Freud used *die*

Try as we might, we cannot shake off free will.

Seele, the soul, to describe the scope of his endeavor. *Seele* was then crudely mistranslated as the "mind," which is not at all what Freud meant. For Freudians, mind is merely the froth on the cappuccino, and Freud was not much interested in the froth of the conscious mind. Freud was after the espresso, the roiling deep of negative emotion that drives the meanderings of consciousness.

These militant denials of cognition led to blind spots: that consciousness is not causal, that imagination has no role, and that free will is an illusion. I could not begin to articulate these blind spots when I entered graduate school, but contrary to the prevailing wisdom of 1964, today, 50 years later, we know the following:

- Conscious thoughts powerfully influence emotions. Thoughts of helplessness produce passivity. Thoughts of loss produce sadness.
- Thoughts of trespass produce anger. Thoughts of a better future produce hope. A science of behavior without the mind is hopelessly insufficient.
- We continually imagine different futures, we evaluate them, and we choose among them. Try as we might, we cannot shake off free will. A science that is only about the past (memory) and the present (perception) without an account of future-mindedness is hopelessly insufficient.
- A science that is only about negative emotions is hopelessly insufficient.

Much of my own story over the next fifty years would be about the struggle to carve out a scientific psychology congenial to these truths.
