

Early Influences on the Development of Industrial and Organizational Psychology

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Industrial and organizational psychology began as applied psychology. Hugo Münsterberg was well-known for his applications of psychology to forensics, psychotherapy, and industrial efficiency. James McKeen Cattell pioneered mental testing and argued for an applicable, if not applied, psychology. Walter Dill Scott and Walter VanDyke Bingham were devoted to the application of psychological principles to the problems of government and industry. The lives and accomplishments of these 4 figures are detailed as a way of examining the development of the subdiscipline between the years 1880 and 1920. The focus of the discussion is on how their efforts peculiarly changed the science and practice of industrial and organizational psychology. Each made a unique contribution in a unique time period. The field continues to benefit from their individual and collective influence.

The subdiscipline of industrial and organizational (I/O) psychology is almost as old as the parent discipline, psychology. Psychology had its start in the rooms of William James at Harvard and in the laboratory of Wilhelm Wundt in Leipzig, Germany, in the late 1870s. The first American journal devoted to psychology did not appear until 1892, the same year the American Psychological Association (APA) was formed. The first text applying psychological principles to problems of business and commerce appeared in 1903, and the first text in industrial psychology appeared in 1910. Thus, it would appear that I/O psychology existed at the beginning. In fact, the core of psychology was experimental psychology, and all other "specialties" or subdisciplines were extensions or outgrowths of those first basic principles.

This article covers the period from 1876 through World War I (WWI). In an attempt to present a coherent description of those early years, consideration is limited to the contributions of four leading figures in the early days of I/O psychology: Hugo Münsterberg, James McKeen Cattell, Walter Dill Scott, and Walter VanDyke Bingham. In his own way, each contributed significantly, but uniquely, to the development of the field. It was through their efforts that other names began to emerge during that period, including Harold Burt, E. K. Strong, Donald Paterson, and Bruce V. Moore. Although others began to

contribute to the growing body of I/O knowledge by the end of WWI, the tone and structure of the field had been developed by these four men. As a result, by concentrating on them, we have a rather complete view of the early days of the field.

One might reasonably ask why is the consideration limited to only American (although Münsterberg was adamant about being seen as a German American) psychologists? Industrial and organizational psychology was peculiarly American at its inception. That is not to say that psychologists in other countries were irrelevant. In fact, there was substantial interaction between American and non-American applied psychologists both before and after WWI. But certainly during the period from 1895 to 1920, special attention was being paid to American scientists and practitioners. This was understandable because America had spawned alternatives to the rather formal and restrained European structuralist paradigm. These alternatives were differential psychology and functionalism. Both of these influences, individual differences and functionalism, are cornerstones of I/O psychology, so it is not surprising that the subdiscipline arose in America rather than in Europe. Thus, for all practical purposes, I/O psychology was peculiarly American during the period in question.

Finally, consideration is limited to I/O psychology rather than to the broader topic of applied psychology. The emergence of the broader arena of applied psychology has been addressed by others (Kuna, 1976; Napoli, 1975) in substantial detail, and although there may be some disagreement (cf. Kuna, 1976) regarding the founders of applied psychology, there is less disagreement about the earliest I/O psychologists.

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In keeping with a goal of making this early history both coherent and interesting, I have kept references to a minimum. Other sources provide substantial detail and documentation for the material presented here (Landy, 1992b; 1993). Rather than simply reproduce those early treatments, I have extended those earlier discussions to include new material and inferences. Many of these extensions are deconstructionist in temper, but I believe that they are reasonable expansions and not at odds with earlier work. Those interested in the details and primary sources might examine a recent treatment of Münsterberg (Landy, 1992a) and a recent chapter on the early influences in the development of I/O psychology (Landy, 1993), as well as smaller pieces that have appeared in *The Industrial–Organizational Psychologist* over the past decade (e.g., Landy, 1991a, 1991b).

An Overview

In 1879, Wilhelm Wundt formed a new discipline from an older one: Philosophy gave way to psychology. The transformation had been a long and careful one and was almost inevitable because philosophy alone could not handle the mind–body debate. In addition, philosophy was increasingly influenced by the writings of the positivists and empiricists. By 1879, the time had come to create more room and new tools for the debate, and as a result, the discipline of psychology emerged. The discipline appeared almost simultaneously in both Europe, in the laboratory of Wundt, and America, in the experimental rooms of William James at Harvard. This might have been expected, because both James and Wundt were both philosophers and physicians. Both were fascinated by the interplay of the mind and the body, and both were familiar with the same philosophical writings.

There was an interesting symbiosis between the two initiatives. Because the German branch of the discipline developed relatively quickly, with specific methods and instrumentation, budding psychologists truly interested in learning about the new discipline would spend 1 or more years with Wundt learning technique. After such an internship, they would then return to their home country and either teach what they had learned or use that foundation to develop a paradigm of their own. Three of the four persons we consider (Münsterberg, Cattell, and Scott) did much more than serve an internship. They spent extended periods of time working under Wundt and completed a dissertation under his direction. The fourth of our figures of interest, Bingham, began his graduate career when American universities were fully established with well-developed psychology programs. As a result, it was not necessary for Bingham to travel abroad to receive his training. In some senses, Germany was to developing psychologists what France was to developing painters. Paint-

ers from all over the world converged on France in the latter part of the 19th century and used impressionism as a foundation for developing individual styles and schools of painting. Psychologists went to Germany to learn structuralism and would use that knowledge base as a point of departure for developing new paradigms.

There was some tension between Wundt and his American colleagues, however. Wundt and his associates intended to build the new science of psychology on a protocol intended to identify the underlying elements or building blocks of behavior, a protocol he called *structuralism*. In forming this new science, Wundt believed that its legitimacy would be furthered by developing general laws of behavior rather than a multiplicity of principles, theories, and exceptions. Such an approach was compatible with the existing natural and physical sciences. As a result, he tended to diminish the fact and the importance of individual differences. There would be time for exceptions and modifications later. At its inception, psychology needed to appear as much like existing sciences as possible. This desire to conform to “normal science” also explains, to some extent, the devotion to the brass instruments of the early experimental laboratories. Wundt and his colleagues developed very precise devices for measuring reaction time, the loudness of noises, the brilliance of colors, the variety of smells, and the intensity of pressure applied to various portions of the body. They concentrated on understanding how sensation became perception. Chemists, biologists, and physiologists would be more accepting of a science based on the observable measurements taken to the second decimal place using scientific-looking devices. These precise brass instruments might have also served to make the technique of introspection, a defining parameter of the new experimental psychology, less objectionable.

In contrast, William James and his colleagues had a different foundation and protocol in mind. They believed that the solution to the riddle of behavior could be found in understanding the *function* of behavior and articulated the precepts of *functionalism* or *pragmatism*. They had less interest in brass instruments and the method of introspection and greater interest in individual differences and teleology. They were not so radical as to cast out the instruments of the structuralist laboratory, but they were inclined less to use those instruments to study themselves, as did the structuralists through introspection, and more to study variations in “subjects” as a way of mapping the mind. James had never studied with or under Wundt. In fact, James was largely intolerant of the constraints of German experimental psychology and expended considerable effort to develop a paradigm that was different from structuralism.

Even though three of the four leading figures in the formation of I/O psychology—Münsterberg, Cattell, and

Scott—had studied with Wundt, each departed significantly from the structuralist paradigm. Münsterberg and Cattell acknowledged the importance of individual differences early in their graduate training and developed research programs around differential phenomena and the functionalist paradigm. Scott also acknowledged the importance of individual differences and incorporated this interest into the study of persuasion and eventually motivation. But in each of the three cases, there appears to be an external event or force that strengthened this move away from structuralism. Cattell encountered Sir Francis Galton and was greatly influenced by Galton's attempts to verify the evolutionary principles of his cousin, Charles Darwin. Münsterberg appears to have simply given up his efforts at classic experimentation and theory building because of a lack of acceptance by his American colleagues at Harvard. Instead, he turned his creative efforts toward application. Walter Dill Scott seemed destined to become an academic who would train others in the new discipline of psychology until he was asked to apply these new principles to advertising. Each had an encounter that changed the direction of their lives. The fourth leading figure, Bingham, also experienced an event that changed the course of his professional life. Shortly after Münsterberg underwent his applied transformation, Bingham spent a year at Harvard, initially to study philosophy but, instead, to become one of the first converts of Münsterberg to application. By the time Bingham had received his doctor of philosophy degree (PhD) from the University of Chicago in 1908, he was already in the third generation of I/O psychology. Münsterberg, Cattell, and Scott were already well established in the new science. Nevertheless, Bingham was a product of the foremost functionalist training program in existence and had spent time at Harvard, receiving the influence of both William James and Hugo Münsterberg.

From 1908 until 1915, these four emerging I/O psychologists worked relatively independently. They were certainly well known to each other and, on the occasion of a conference or a university visit, would talk with each other about various developments in the field. Their correspondence files document a keen interest in the work of their fellow practitioners. But they did not collaborate with each other in any palpable way. Geography may have played a role: Münsterberg was in Cambridge, MA, Cattell in New York City, Bingham at Dartmouth, NH, and Scott in Evanston, IL. But more significantly, each had the temperament of a lone wolf—a single contributor.

By 1915, the four leading figures in I/O psychology were well established with national reputations, the respect of their colleagues, and a bright future. Although they did not collaborate with each other on theory building, research, practice, or writing, they did share an appreciation for the two primary building blocks of this

new science: individual differences and the functionalist perspective. World War I presented a dramatic opportunity to collaborate in further establishing the foundation of this new science, but two of the four would not participate in the war effort. Cattell was an isolationist—pacifist and would have nothing to do with applying the new science to the art and practice of war, and Münsterberg died on the eve of America's involvement in the "great war," and, thus, played no role in this grand experiment. It was left to Scott and Bingham to demonstrate what I/O psychology could accomplish in the "real world." Before we consider the role of WWI in the development of I/O psychology, it is best to consider, one at a time, the individuals who had brought the field to this point.

Hugo Münsterberg

Münsterberg's early personal and professional years have been well documented elsewhere (Hale, 1990; Landy, 1992a) and are not repeated here. Instead, I cover the period leading up to his conversion to applied psychology in 1907, until his sudden and untimely death at the age of 53 in 1916.

Hugo Münsterberg was brought to Harvard in 1892 by William James for two reasons. First, James had no interest in teaching or running a laboratory. In addition, he was opposed to much of the work of Wundt and was pleased to have a well-respected critic of Wundt on the faculty. However, Münsterberg was a German and was seldom permitted to forget that fact. He was constantly chided because he was not a "Yankee" and did not possess American sensibilities. His English writing was also often ridiculed by reviewers. As a result of this latter handicap, Münsterberg chose to publish his more significant work in German, a language increasingly inaccessible to American scholars as the exodus to the labs of Wundt slowed to a trickle at the turn of the century. He did not help his cause any by his bombastic manner, his tendency to pontificate, or his loyalty to his fatherland and his proselytizing efforts on behalf of that country. Nevertheless, Münsterberg was appointed chair of the Department of Psychology at Harvard in 1900, a short 8 years after first setting foot on American soil, and he remained chair for almost a decade and director of the psychology laboratory until his death. Even though he could see the possibilities of an applied psychology through the work of his colleagues in Germany (e.g., William Stern and Sigmund Freud), before 1907, he had little interest in application himself. Furthermore, Münsterberg regularly admonished those who would seek such application. He conceded that a classically trained psychologist might have some impact on pedagogy but warned that psychology in the hands of a teacher would wreak havoc.

In 1907, Münsterberg took a dramatic turn toward ap-

plication. In the course of less than 1 year, he moved from a critic to a cheerleader. From 1907 until his death in 1916, his applied exhortations were everywhere. He published applied books in clinical, industrial, educational, and forensic psychology. He prepared articles for magazines like *Harper's Monthly*, extolling the virtues of the new science for everyday problems. He lobbied presidents, congressional leaders, cabinet heads, and men of influence to consider the potential contributions of psychology. He was a favorite contributor to influential newspapers both in the form of columns and letters to the editor and was always available for a quote. At the time of his death, he was preparing a series of short mental tests to be administered to moviegoers before the feature film that would demonstrate the importance of psychological assessment to well-being.

How can one account for this radical transformation? After reviewing all the available documentation, I can conclude only that his frustration at not being accorded the status he believed he deserved at Harvard led to his abandonment of orthodox experimental psychology in favor of its application. If he could not get attention and respect from his colleagues, he would get it from a broader domestic and international audience. There are indications of earlier dissatisfaction with his colleagues. He resigned the chairmanship of the department in 1905 because of a letter from James that he considered insulting. Münsterberg was the driving force in establishing the new psychology building and believed that those efforts were not given suitable recognition. In his letter, James scolded Münsterberg for playing too great a role in the public ceremonies held for the dedication of the new building, Emerson Hall. Later, James persuaded him to reconsider his resignation, and Münsterberg returned to his post. George Santayana, one of Münsterberg's colleagues in the philosophy department, had taken to openly ridiculing Münsterberg's mannerisms in his letters to colleagues. Münsterberg had long developed a sensitivity for detecting such signals. Even William James's literary brother, Henry, took advantage of opportunities to embarrass Münsterberg. Münsterberg had taken great pains to debunk seances and other supernatural events that were of interest to William James. Henry James made a contribution to Harvard of \$10,000 with the stipulation that it must be used to study paranormal events. Münsterberg lobbied (unsuccessfully) to have Harvard reject the donation. No one could misunderstand the message in that donation. Were such a situation to develop today, the target of scorn might simply leave for another university. But Münsterberg could not leave Harvard. It was the premier program in the country, and he would not stoop to join a lesser faculty. So he simply abandoned that faculty intellectually and devoted himself and his considerable talent and enthusiasm to application.

During the period 1907–1916, Münsterberg was a constant lobbyist for the contributions of psychology. He worked tirelessly to develop the notion of a National Institute of Industrial Psychology, an idea already gaining momentum in several European countries. He was in great demand as a consultant and entrepreneur of psychological practice, and he was not alone in this effort. Scott was establishing a substantial reputation in the business community. Cattell had gathered an impressive group of applied statisticians and differential psychologists at Columbia, and Bingham was beginning to attract considerable attention for his college testing program at Dartmouth. Nevertheless, it was Münsterberg who had best access to influential national leaders, both politicians and captains of industry.

It is likely that Münsterberg's efforts on behalf of applied psychology created the environment that embraced the potential contribution of psychology for the classification of inductees into the armed services in WWI. Münsterberg published the first modern book in industrial psychology, *Psychology and Industrial Efficiency*, first in German (1910) and then in English (1913). This book was the bible for the application of differential psychology in industry and established the concepts of validity and utility. There was no rival for this book until well after his death. Harold Burt published a revision and extension of Münsterberg's text in 1926. Morris Viteles published his landmark comprehensive text in 1932, more than two decades after the appearance of Münsterberg's text. As one might expect, these later publications greatly enhanced the coverage and methods of the field. But they did not replace the structure that Münsterberg had put in place; rather, they built on it.

It is somewhat unsettling to conclude that a mainstay of applied psychology was in that subdiscipline by caprice. But perhaps it is not without precedent. Freud turned to clinical practice because as a Jew, he was not permitted to hold a position in the university. Skinner discovered intermittent schedules of reinforcement because he preferred to spend time with his new child rather than forming food pellets and filling food trays on weekends. The important principle is that each of these men found a way to illustrate basic principles of behavior in their work.

James McKeen Cattell

James McKeen Cattell was born in 1860 in Harrisburg, PA, the son of the president of Lafayette College. His precollege education was accomplished primarily through private tutoring and instruction from the faculty at Lafayette, but he did formally enroll at Lafayette and receive his undergraduate degree in 1880 (Landy, 1993). While enrolled at Lafayette, he was greatly influenced by the

philosophical system of Francis Bacon known as *empiricism*. One interpretation of this system is that through the collection and analysis of empirical data, structure will be liberated and inference will be little more than recognition of obvious principles. In such a system, theory building and hypothesis testing have, at best, a secondary and subsequent role rather than a primary or formative one. This extension of Baconian thought has also been labeled *vulgar utilitarianism* (Sokal, 1982).

In 1881, Cattell had a degree, money, standing, time, and an interest in pursuing intellectual challenges, so he left for Europe to study philosophy in Germany. Had he been born 15 years later, he would most likely have studied philosophy at Harvard with Josiah Royce, George Santayana, William James, and Hugo Münsterberg, but instead, he traveled to Göttingen to study with Rudolf H. Lotze. His plan was to return after a year and complete his studies for the PhD with G. Stanley Hall at Johns Hopkins. Very shortly after Cattell's arrival at Göttingen, Lotze died, and Cattell transferred to Leipzig and spent the year attending Wundt's lectures. Unlike many of his American contemporaries at Leipzig, Cattell mastered German and was able to take full advantage of his year with Wundt. He returned to a fellowship at Johns Hopkins but longed to return to Wundt, and did after a year in Baltimore. In 1886, he received his PhD from the University of Leipzig and moved on to Cambridge University, Cambridge, England, to pursue a doctor of medicine degree.

Shortly after arriving at Cambridge, Cattell was contacted by Francis Galton, a cousin of Charles Darwin who was working out the details and implications of Darwin's notions regarding hereditary transmission and natural selection. Both Darwin and Galton believed that traits, mental and physical, were transmitted from generation to generation along genetic pathways. Galton had established a laboratory to collect data about physical traits but knew little about mental measurement. Cattell, on the other hand, had been developing and refining mental measurement techniques in Wundt's laboratory, and Galton was aware of that work. As a result, when Galton learned that Cattell was at Cambridge, he asked Cattell to advise him on the addition of mental measurements to his collection of physical measurements.

Cattell was greatly influenced by Galton, as most would be. Galton was a significant intellectual figure, conversant with the natural and the physical sciences, inventive, relentlessly curious, and with a penchant for the application of scientific principles to real-world issues. He was also committed to the same brand of Baconian empiricism with which Cattell was familiar. To support Darwin's theory of genetic transmission, it was necessary to observe and measure what was known as "biological variation," or individual differences in traits.

Like others in Wundt's laboratory, Cattell had noticed

individual variation in participants. Unlike Münsterberg, who saw these individual variations as rather glaring exceptions to Wundt's attempt to formulate general laws, Cattell simply noted these differences but was neither unduly concerned nor interested in them in his laboratory work. Nevertheless, many of the measurement techniques that he had developed did reveal these differences. This was what Galton needed: a medium for illuminating individual differences in traits beyond the simple physical or anthropometric ones he was using in 1886. Thus, when Cattell arrived in Cambridge at that time, the stage was set for a very useful collaboration between Galton and Cattell. For the next 2 years, Cattell was able to apply the empiricist principles that he had incorporated at Lafayette through the work of Galton. In turn, he was able to provide Galton with a much broader range of traits to measure. He developed measures of reaction time, time estimation, and memory, as well as the more physiologically based measures of the senses (e.g., smell, taste, and touch).

Cattell left Cambridge in 1888 with a strong belief in Darwinist theory and the principles of genetic transmission, as well as an impressive array of measurement techniques for assessing mental characteristics, or traits. Throughout his lifetime, Cattell was an enthusiastic eugenicist, believing that progress in the human condition could be made through control of breeding patterns and the improvement of genetic stock. He made a standing offer to each of his daughters that he would present them with \$1,000 if they chose to marry an academic. This was the natural applied extension of his Darwinist beliefs. He was not unusual in that respect. Darwin's propositions were well accepted in many scientific circles, and the behaviorism of John B. Watson was still decades away. In the scientific thinking of the time, nature prevailed over nurture.

Cattell returned to America in 1888 without a medical degree. He was now more interested in the new science of psychology than either medicine or philosophy. He accepted teaching positions at both the University of Pennsylvania and Bryn Mawr College. In 1889, he was offered a professorship at the University of Pennsylvania, which he accepted, and he then set about establishing the psychology laboratory there. His work with Wundt had helped to establish his reputation as one of the leading thinkers of the discipline, and in 1892, he was invited to join a select group of other psychologists who would form the APA.

In 1893, Cattell was offered a position at Columbia University, and he accepted. He held this position until he was fired in 1917. The circumstances of his termination were complicated. He was against the entry of the United States into WWI and, as such, was branded a traitor by many of his Columbia colleagues. Many believe that this was the reason for his dismissal. But Cattell was also a

difficult faculty member and had openly challenged and ridiculed the president of Columbia and many of his colleagues for many years preceding his 1917 dismissal. This insubordination was the reason for his dismissal rather than any charges of treason (Gruber, 1972).

During the period 1893 through 1900, Cattell had been given carte blanche to assess incoming freshmen at Columbia with his mental tests. This he did with great enthusiasm. His mental tests were tests of reaction time and sensory abilities and involved little of the higher order mental faculties that were of interest to colleagues such as Alfred Binet, James Jastrow, James Mark Baldwin, and Lewis Terman. Further, he proposed no theory that would unify these measures into a coherent view of a construct such as intelligence. If Cattell had a working theory, it was that some people were suited for postsecondary education and others were not. By eventually comparing his assessments with college success, he hoped to better articulate this proposed relationship. As a corollary, Cattell also believed that students might be given some guidance about avenues, or courses, of study to pursue based on these assessments (e.g., natural sciences vs. physical sciences vs. pedagogy), but again, this was more assumed than proposed. He was confident that from the pattern of associations among the variables (including both the mental measures and grades), he would be able to illustrate both a theory of intelligence and the practical value of *mental testing* (a phrase he had coined in 1890). The data were duly analyzed in 1900, and the results were a disaster. Cattell was not able to demonstrate any coherent or consistent relationship among his various mental measures. Further, there was no relationship between any of these mental measures and college success. Eight years of study had come to nothing.

Fortunately, while gathering his empirical data on college freshmen, Cattell had continued to be active in professional and scientific matters. He had become the owner and editor of several leading journals, including *Psychological Review*, *Psychological Abstracts*, and *Psychological Bulletin*. In addition, he had begun to identify "eminent men of science" and had assumed the position of arbiter of excellence in psychological accomplishments. Thus, by the time he had analyzed his 8-year collection of data and found little support for his predictions, he was well established as a leader of the science of psychology, and his stature was only minimally affected by this failure.

The period 1900 through 1917 can be characterized as a time of campus activism for Cattell. His professional contributions to psychology were now more in the form of journal editing, advising colleagues in the development of psychology programs, and advocating the application of psychology to everyday problems. But even in this latter arena, he was generally unfocused, arguing in the abstract that psychology was applicable rather than dem-

onstrating its applicability. Thus, Münsterberg could be seen as the advocate of applied psychology through his examples of application, but Cattell was the advocate of applicable psychology.

Because of his opposition to America's entry into WWI, Cattell was isolated from the greatest opportunity to apply psychology that had ever presented itself: the psychological testing of army recruits. This would have been a perfect opportunity to resurrect his belief in the value of mental testing. But this task was left to Walter VanDyke Bingham and Walter Dill Scott. Nevertheless, Cattell was able to take advantage of the newly emerging enthusiasm for mental testing after the war. He founded the Psychological Corporation in 1921 and reintroduced his unique brand of mental testing to industry. For many reasons, some related to his personality and others related to his modest skills as a leader and visionary, the Psychological Corporation floundered badly until he relinquished control of the organization to Bingham in 1926. Cattell continued to contribute to the growth of psychology through his administration of professional journals but had little additional impact on I/O psychology, applied psychology, or general psychology between 1926 and his death in 1944.

How, then, are we to think of Cattell and his contribution to what has become I/O psychology? He was certainly committed to both differential psychology and to application. Those were positive forces in psychology's early development. Further, he understood the centrality of the concept of a scientist-practitioner and developed the Psychological Corporation to demonstrate the value of this model to both the profession and the public. But he failed to grasp the importance of theory building and hypothesis testing while others around him were actively engaged in such pursuits. When his empirical structure collapsed, he had nowhere to turn. As a subdiscipline, I/O psychologists have long had problems with theory development. In an interview several years ago (Landy, 1991b), Morris Viteles spoke disparagingly of I/O psychologists who spent their time in theory building. He considered theory building a luxury that society and the profession could ill afford. I suspect that Cattell would have agreed. If there is a lesson to be taken from these examples, it is that theory turns data from potential to kinetic energy. Without theory, Cattell was mute.

It is worth speculating what Cattell might have done with modern analytic techniques and hardware. Would path analysis or confirmatory factor analysis have changed the outcome of his research? I think not. His analyses were conducted by others. His was not an analytic weakness, it was a failure to appreciate the value of reasoning. He did not understand that data follow thought rather than precede it. His contemporaries in cognitive research—Charles Spearman, Lewis Terman, and Robert Yerkes—

were busy building models of the intellect, yet he persisted in believing that the structure would emerge and yield theory.

What then were Cattell's contributions? Like Münsterberg, he was a proselytizer. He took every opportunity to speak for the power of differential psychology to affect lives. Unlike Münsterberg, he gathered a substantial cadre of functionalists, applied psychologists, and applied statisticians around him at Columbia, including E. L. Thorndike and Leon L. Thurstone. In the period after WWI, he devoted his considerable reputation and energies to developing the Psychological Corporation and, in doing so, helped to establish the legitimacy of psychology applied to industry with other nonapplied psychologists. The Psychological Corporation was set up as a nonprofit corporation in which psychologists held shares. The profits from the application of psychology would go toward endowing a research fund for supporting both basic and applied psychological experimentation. In fact, Cattell's administrative skills did not match his vision, and the Psychological Corporation wallowed until Bingham took over in 1926. Nevertheless, Cattell was able to persuade a substantial number of APA members to buy shares in this applied effort. This was no small feat and undoubtedly increased the respect for applied psychology among non-applied colleagues.

Walter Dill Scott

In the year that Münsterberg returned from Harvard to Germany and Cattell finalized his testing program at Columbia, Walter Dill Scott received his undergraduate degree from Northwestern University and entered the Presbyterian seminary with the goal of becoming a missionary in China (Jacobson, 1951). Three years later, in 1898, it became clear to him that his superiors would not give him the assignment that he wanted. Bitterly disappointed, Scott left for Leipzig to study psychology with Wundt. In 1900, he received his PhD. He was one of the last Americans to study with Wundt and completed one of the few nonempirical dissertations to come out of Wundt's program: a consideration of impulses. Scott had a strong interest in motivation, and his dissertation, along with some companion research on suggestion and persuasion, laid the foundation for the expression of this interest over the next 15 years.

On his return trip from Germany, Scott stopped for a year with Edward Bradford Titchener at Cornell, to learn how to assemble and administer a psychological laboratory. He planned to return to Northwestern and teach psychology, so this training would be put to good use. In 1901, he assumed a position as an assistant professor of psychology and pedagogy at Northwestern and settled in for a career of teaching and research.

Even before Scott returned to Northwestern, a group of visionary business leaders glimpsed the advantages of applying psychology to advertising. They tried to interest Hugo Münsterberg first, and then E. L. Thorndike, to explore this possible application of the new science of psychology. Münsterberg was still in his antiapplication phase and would have none of it. Thorndike was still a good deal more interested in animal learning than in human motivation. Recognizing that Chicago now had its own Wundt-trained psychologist in the form of Scott, the advertisers turned to him for help. Scott was anything but enthusiastic. He had just left Titchener, who was a critic of application. His time with Wundt had provided little opportunity for application. And like most new assistant professors, he was anxious to create a good image for himself with his Northwestern colleagues. Nevertheless, he saw advertising as an arena to test out some of his ideas about attention, suggestion, and persuasion. As a result, he agreed to provide a series of lectures in the general area of applying psychology to advertising but kept this activity hidden from his faculty colleagues.

Scott's lectures were very well received and he ended up giving a regular series of these lectures. In addition, he agreed to write a regular column in an advertising publication known as *Mahin's Magazine*. In all, he published 33 columns over an 8-year span. These columns also formed the foundation for two books that Scott published. In 1903, he presented 14 columns in *The Theory of Advertising*. This book is, in all likelihood, the first publication applying psychological principles to the world of business (Kuna, 1974, 1976). In 1908, he published a second book with the original 14 articles and 19 additional ones. Feeling more professionally secure by this time, Scott was emboldened to use the title *The Psychology of Advertising*. Applied psychology was popular in 1908. In that same year, Münsterberg published his first formal foray into the world of the applied with his text on forensic psychology, *On the Witness Stand*.

As a result of his publications, by 1910, Scott's name was well-known in business circles. He had branched out from advertising to consider issues of leadership and supervision, industrial efficiency, selection, and motivation. In 1910, he published a series of essays on the general application of psychological principles to the problems of industry: *Increasing Human Efficiency in Business*. In that same year, Münsterberg began writing his text, *Psychology and Industrial Efficiency*, but it was published only in German. The English edition would not appear until 1913. Thus, Scott was more widely recognized than Münsterberg in industrial circles. In addition, Münsterberg's book was a careful introduction to application only after a solid empirical and theoretical foundation had been laid. The first half of Münsterberg's text could have been considered a book on general psychology. Scott

wasted no time on principles. He went immediately to application, which made it the more attractive text for business leaders.

During the period 1901 to 1916, Scott prospered at Northwestern. In 1909, he was given a position as a professor of advertising in the school of commerce, and by 1912, he was holding joint appointments in both psychology and advertising. Scott was more than the equal to Münsterberg in creative application and theoretical thinking. He explored the psychological characteristics of piece-rate payment systems (unlike the more mechanical economic explorations of his contemporary, F. W. Taylor), organizational culture, worker attitudes, and motivation. It is best to think of his contributions as pretheoretical in these areas. Although his innovations neither flowed directly from, nor led directly to, a full-blown theory of behavior, they were based on contemporaneous research and theoretical propositions of people such as Ordway Tead, E. L. Thorndike, and John B. Watson. If I/O psychologists were searching for a role model, Scott would best fit the bill. He was a legitimate bridge between the basic and applied and was widely recognized as such.

In 1916, Carnegie Institute of Technology (now Carnegie Mellon University) embarked on an ambitious effort to build a research institute to serve the business community in Pittsburgh, PA. To lead this effort, the Carnegie Institute chose Walter VanDyke Bingham. Bingham immediately nominated Scott to be his deputy and assist in this pioneering effort. The president of Carnegie Institute persuaded the president of Northwestern University to "loan" Scott to Carnegie for a few years. In 1916, Scott was appointed as a professor of applied psychology and joined Bingham in developing the Division of Applied Psychology. By now, Bingham and Scott were the two most prominent industrial psychologists in the country and commanded both attention and respect. A young Bruce Moore made his way to Pittsburgh to study with them, only to find that they had left to apply their new science to winning WWI. Moore promptly enlisted as well!

Scott was at Carnegie less than 2 years. He and Bingham left in 1917 to assist the adjutant general of the U.S. Army in techniques of selection, training, and performance assessment. Scott had started several testing and performance measurement projects when he arrived at Carnegie. He simply transferred those projects to the military environment and continued his work. More is said about these military years in the notes on Bingham.

When the war ended in 1919, several of Scott's colleagues persuaded him to form a private company that would consult with businesses. This was to be pure application with little formal research and no teaching. He agreed. The Scott Company was formed with headquarters in Philadelphia. The staff was a "who's who" of psychol-

ogy, including John B. Watson, Bingham, Robert Yerkes, and E. L. Thorndike. Scott was also elected president of APA in 1919. He was the consummate scientist-practitioner. And at the peak of his power and popularity, he left psychology for administration. He was offered the presidency of Northwestern and accepted it. He was an enormously successful president and remained in that office until his retirement in 1939.

Although less the public promoter than Münsterberg or Cattell, Scott had a substantial influence on the increasing public awareness and credibility of industrial psychology. As a result of his efforts, over 1 million men, who might never have encountered a psychologist for the rest of their lives, were tested. This was as powerful a promotional device as any that Cattell or Münsterberg might have proposed. In fact, Münsterberg had already begun such an initiative. As mentioned earlier, at the time of his death, Münsterberg was preparing to expose movie audiences to psychological testing. More than Münsterberg, Cattell, or Bingham, Scott valued theory as much as application.

The record is clear that without Scott, the testing movement launched with the armed forces in WWI would not have occurred. He had the vision, administrative skill, and scientific stature to pull it off. Yerkes had gone in a very different direction and was more interested in winning an intellectual battle with Terman over the nature of intelligence than he was in winning a war. There is little debate about the effect of WWI testing on the growth of I/O psychology. We can be grateful to Walter Dill Scott for the success of that effort.

Walter VanDyke Bingham

In 1901, at the age of 21, Walter VanDyke Bingham, armed with an undergraduate degree from Beloit College, embarked on a career as a high school mathematics teacher. He had taken courses in psychology at Beloit from a recent PhD student of Wilhelm Wundt but was not immediately attracted to the new science. After 4 years of high school teaching, Bingham was restless and unchallenged and decided to return to study psychology at the University of Chicago. At the time, the University of Chicago had a vibrant and ambitious psychology training program. John Dewey had grafted the pragmatism of William James onto the functionalism of Thorndike and Cattell and created a new generation of functionalism before he left to join Cattell at Columbia in 1905. This new functionalism was appealing to the students looking for opportunities for application. A new assistant professor in the department was John B. Watson, who would soon power a paradigm shift with his introduction to the new model of behaviorism. Watson had received his PhD at Chicago in 1903.

After 2 years of study, Bingham left for Harvard to

study philosophy for a year with William James, George Santayana, George Herbert Palmer, and Josiah Royce. Although William James was his Harvard adviser, Bingham was impressed by the new applied psychology of Hugo Münsterberg. After his year of study, Bingham returned to Chicago and received his PhD in 1908 for a dissertation based on the perception of melodies.

Given the links between Chicago and Columbia, it is not surprising that Bingham's first postgraduate job was at Columbia, assisting E. L. Thorndike in research. Although his primary research interest was still the perception of music, Bingham became interested in the differential research at Columbia and was soon an active collaborator in the new mental testing program. He was particularly impressed with Thorndike's emerging theory of intelligence and was fast becoming a critic of Spearman's *g* theory.

In 1910, Bingham was offered a faculty position at Dartmouth and accepted it. He was to supervise the experimental laboratory. In addition to his teaching and administrative responsibilities, he introduced a student testing program patterned after Cattell's efforts at Columbia. As a result of his time with Thorndike, Bingham's testing program was more sophisticated than Cattell's. It had a heavier flavor of the "higher" mental abilities, particularly reasoning. Nevertheless, the Dartmouth student testing program proved no more useful than the program at Columbia. In 1912, a bright mathematics major took Bingham's psychology course, and because they shared a love of mathematics, Bingham took the student under his wing and suggested that he pursue advanced studies in applied psychology at Harvard, with Hugo Münsterberg. That student was Harold Burt. He did go to Harvard, he did study under Münsterberg, and he became a leading industrial psychologist during the period between the two world wars.

While attending an APA convention in Philadelphia, Bingham was introduced to the president of the new Carnegie Institute of Technology. He was asked to visit Carnegie and prepare a report outlining what psychology could do for the institute. After a site visit, Bingham suggested that psychology could help students to understand and influence people. Further, he felt that mental testing could identify those applicants most suitable for admission as well as help to direct those students who were accepted to the right curriculum of study. This vision of mental testing was identical to that proposed by Cattell at Columbia 20 years earlier and by Bingham, himself, at Dartmouth.

The president of Carnegie was so impressed with Bingham's report that he offered him the opportunity to head a division at Carnegie that would accomplish the objectives that Bingham had identified. It would be called the Division of Applied Psychology and would have several sections, including the Bureau of Mental Tests, the Depart-

ment of Training Teachers, and the Department of Psychology and Education. On the basis of that plan, Bingham accepted the position.

Shortly after his arrival, Bingham shifted the thrust of the initiative. As originally conceived, it was to focus inward on the development of students. This focus shifted rapidly toward the development of external consumers—businesses and government agencies (Bingham, 1952; Ferguson, 1965). This was due, at least in part, to the objections of other universities in the area to the training of psychologists at the new institution. As a result, Bingham produced no PhD students, because there was no formal graduate instruction program in the new applied psychology.

Bingham's first "customers" were a group of local business leaders who asked him to develop a program for training sales representatives. To fulfill this request, Bingham introduced the Bureau of Salesmanship Research and persuaded Northwestern University to assign Walter Dill Scott to head the new bureau for its initial period. Bingham was familiar with Scott's writings in advertising and believed that such a background was perfect for directing research on and training of sales personnel. In addition, Scott had recently begun a research project that focused on the selection of sales personnel.

As a result of early successes of the Bureau of Salesmanship Research, a second bureau was formed to concentrate on the training and development of retail personnel. These efforts were well publicized, well funded, and well staffed. During a 9-year period after Bingham's arrival at Carnegie, he supervised the work of Scott, Guy Whipple, Raymond Dodge, L. L. Thurstone, J. B. Miner, Marion Bills, Max Freyd, Beardsley Ruml, Richard Uhrbrock, and Clarence Yoakum. By 1917, the new Division of Applied Psychology was under a full head of steam.

The United States entered WWI in 1917, and the Division of Applied Psychology offered its services to the government. Simultaneously, APA, through its president, Robert Yerkes, took the lead in the mobilization of psychology in the war effort. Yerkes saw the war as an opportunity to demonstrate the value of psychology and to strengthen the position of the discipline in the scientific community. Scott and Bingham were less ideological; they simply wanted to help. There was considerable tension between Scott and Yerkes on this point, and Bingham was the mediator. A bargain was struck that left Yerkes in charge of recruit selection and classification and Scott in charge of recruit placement. Bingham was interested in the work of both camps, so he continued to support the efforts of each as well as to act as channel of communication between them.

When the war ended in 1919, mental testing was a familiar process. Not only had Yerkes and Scott been successful in publicizing the testing program, but well

over a million recruits, many who would return to positions of power in business and government, had undergone testing. Scott never returned to Carnegie. Bingham returned to Carnegie, but the war had derailed the Carnegie program of applied psychology and the new Scott Company was doing much of the work of the Division of Applied Psychology. As a result, Bingham left Carnegie in 1924 to head the Personnel Research Federation and, in 1926, to take over the direction of the Psychological Corporation from Cattell. From 1926 until his death in 1952, Bingham worked to achieve recognition and respectability for I/O psychology. During the period 1926–1940, this caretaker role was an important one because there were no “elder statesmen” left to fill that role. To be sure, there were a number of newer I/O psychologists coming along who would make significant contributions, such as Harold Burt, Morris Viteles, Robert Hoppock, and E. K. Strong. But none of these individuals were yet well enough known to assume the role of spokesperson. Münsterberg was dead. Scott was devoting all of his energies to the presidency at Northwestern, and Cattell’s role had become exclusively that of journal owner–editor. During that period, Bingham represented industrial psychology in the national public forum. He was appointed to commissions, hosted a weekly nationally syndicated radio program devoted to applied psychology (and, in particular, highway safety), and contributed frequently to newspapers and magazines on topics of applied psychology.

Bingham’s contribution to the development of I/O psychology was manifold. His vision led to the Division of Applied Psychology. His efforts as a statesman leveraged the considerable egos of Scott and Yerkes to produce a massive mental testing program. His ability to explain the importance of applied psychology to radio audiences, readers of newspapers and magazines, legislators, and business leaders maintained the momentum that had developed during the war.

Discussion

There are some inferences that might be drawn from this review of the leading figures in the development of I/O psychology. With respect to the subdiscipline, the differences between I/O psychology and other branches are rather striking. First, it had had remarkably little internal conflict in its development. During the period from 1880 to 1920, there was little of the rancor that characterized differences between Freudians and non-Freudians or neo-Freudians, or between those who would later follow Clark Hull and Kenneth Spence and the advocates of behaviorism. This may be seen as good or bad. It is good because it has permitted I/O psychologists to work together toward some common goals, such as ability assess-

ment, training models, or organizational design. If there is a downside, it is that many disciplines and subdisciplines have flourished in the context of intellectual conflict. The most striking example of that was the competition between Linus Pauling and the Watson–Crick team for breaking the DNA code. Part of the reason for the absence of conflict may have been the absence of conflicting theories. In fact, with the exception of an emerging classical test theory, there were few theories of any kind. Or the absence of conflict may have been because there was little opportunity for power struggles to occur. Münsterberg died. Cattell withdrew. Scott left the field. Bingham endured. To be sure, these figures were capable of conflict. Münsterberg fought with everyone, as did Cattell. Scott’s battle with Yerkes was bitter and long lasting. Bingham, alone, seemed conflict free. For better or worse, during its formative years, I/O psychology had at least few internecine battles.

There were really two generations of I/O psychology represented in the figures we have considered. Münsterberg and Cattell formed the first generation, and Scott and Bingham, the second. The third would include people like Strong, Burt, and Viteles. There were some commonalities between those first two generations, however. Each of the four was classically trained, three by Wundt directly. They were well trained in the substance of the discipline. This, in turn, afforded them the respectability and tolerance of their less applied colleagues. Further, each of the four had gained considerable respectability for their accomplishments. Three of the four had written landmark texts; three of the four were elected to the presidency of APA. All had received recognition from groups beyond the borders of psychology. All gravitated toward policy formulation. They were driven to change systems of thinking and action, and they sought to influence the well-being of collections of people, whether they be students, soldiers, or employers. Their thoughts were all on a grand scale.

There is little value in singling out one figure as the founder of the subdiscipline. Each had a unique influence in his own way and in his own time. In this case, the whole was greater than its constituent parts. It is relatively easy to trace the path of I/O psychology from the groundwork laid by these four men to the present-day architecture. The commitment to differential psychology is obvious, as is the intricate interplay between practice and science. Although they may not have developed a completely articulated discipline by 1920, many of the tools and the underlying assumptions of current research and practice were anticipated by their collective work.

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Sternberg Appointed Editor of *Contemporary Psychology* (*APA Review of Books*), 1999–2004

The Publications and Communications Board of the American Psychological Association announces the appointment of Robert J. Sternberg, Yale University, as editor of *Contemporary Psychology (APA Review of Books)* for a 6-year term beginning in 1999.

Sternberg, at the request of the Publications and Communications Board, as well as many readers, will be embarking on a program to make the journal more timely, more interesting, and more relevant to psychologists during his editor-elect year in 1998. Some of the changes envisioned include fewer but longer and more thoughtful reviews of books, reviews only of "new" books (with a few noteworthy exceptions), comparative textbook reviews at strategic times of the year, and changes in publication frequency and pricing. Sternberg welcomes suggestions for improving the journal and serving reader needs.

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