Psychological Testing in Personnel Selection, Part I: A Century of Psychological Testing

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This article is the first in a three-part series that examines the development of selection testing. Part I focuses on the historical development of personnel selection testing from the late 19th century to the present, with particular attention given to personality testing. Attention is given to the efforts of early industrial psychologists that shaped and defined the role of testing in the scientific selection of employees. Part II examines the development of methods and standards in employment testing with particular emphasis on selection validity and utility. Issues of selection fairness and discrimination in selection are explored as they relate to psychological testing. Part III explores the development and application of personality testing. The transient nature of models of personality is noted, and current paradigms and the utility and fairness of personality testing for modern organizations are discussed.

The application of psychological testing to human resource selection, particularly the use of instruments designed to assess personality traits, has a long, colorful, and somewhat contentious history. Personnel selection in general, and the concomitant use of varied forms of psychological testing in particular, has its origins in the late 19th century. Much of the developmental work in the scientific methods of selection can be traced to the efforts of early industrial psychologists to support the military through two world wars, as well as their contemporaneous marketing efforts to have their craft applied to organizational problems. From the natural selection concepts that formed the foundations of Frederic Taylor's scientific management, through the informal techniques of early character analysis and to the modern application of selection instruments based on statistical analyses of test reliability and validity, the use of tests and other techniques for the improvement of personnel selection and performance has never been without controversy. Whether the tension was over the proper role of testing professionals, the appropriate balancing of management demands for efficiency and fairness to employees, or the usefulness of tests themselves, the unfolding history of psychological testing represents a microcosm of American business history.

Similarly, the study of personality has a rich and varied tradition within the field of psychology. The controversy over the desirability of using personality testing to make selection decisions has deep historical roots. Traditionally, many industrial psychologists rejected the use of personality testing because they believed the practice was unreliable and invalid. Indeed, one classic text in personnel testing devotes an entire chapter to the special problems that exist in using personality testing in selection.[1] Most of the early research on personality testing found low validity and reliability coefficients, and literature reviews dating from the 1960s that reinforced the shortcomings of personality testing[2] led to a move away from personality testing in selection. Many HR practitioners, however, have continued to use personality testing with an optimistic and enduring faith in its ability to discriminate between good and poor job candidates.[3]

Contemporary researchers have pointed to many problems in personality testing as explanations for its inability to predict job performance. Chief among these are that there has never been a generally accepted definition of personality or an agreed-upon set of personality traits. Theories and models of personality and personality traits have ranged from Eysenck's 2 basic dimensions of personality to Cattell's 171 traits and have included nearly everything in between.[4] It has not been until relatively recently that the Big Five model of personality embraced the notion that a broad definition of personality that collapses specific traits into more general personality dimensions can be used to predict the broad set of behaviors that define job performance.[5]

This article explores the evolution of personnel selection testing in general, and of personality testing in particular. We describe the historical development of personality testing and the impact of the work of early industrial psychologists that has shaped and defined the role of testing in the scientific selection of employees. We highlight the transient nature of models of personality, the description of personality traits, and the use of personality instruments while examining the evolution of personality measures and the ways research has shaped the construct of personality and its measures. Just as many of yesterday's models have lost their luster, today's personality models and test instruments may be viewed very differently in the future. This realization opens the door to exciting research and development possibilities, as well as prospects for a renewed use for personality testing.

The Origins of Industrial Psychology

The roots of psychological testing lay in the origins of industrial psychology in the late 19th and early 20th centuries. The field represented the convergence of scholarship and application from the disparate fields of psychology, engineering, and business. As early as the 1880s, authors such as Henry R. Towne and Henry Metcalf had proposed that business management, viewed as an art in the late 19th century, should be thought of as a science and would benefit from engineering's professionalization because it had foundations in and proclivity for science.[6] Although schools of management science in the engineering disciplines had been founded on the East Coast, late 19th–century universities did not readily embrace either engineering or business curricula. However, the Morrill Act of 1862 ushered in an era of change in higher education by promoting

the chartering of land-grant universities that moved away from offering a strictly liberal arts education and toward technical education.[7] Several well-known and prestigious universities, including the Universities of Chicago, Pennsylvania, and California at Berkeley, incorporated management and engineering programs in their curricula by the beginning of the 20th century.[8]

Although psychologists, as practitioners of the traditionally scholarly discipline of psychology, resisted the application of psychological models and theories to managerial problems, individuals such as Walter Dill Scott and Hugo Munsterberg founded the field of industrial psychology when they began to explore the serious application of psychological principles to problems in education, law, marketing, and management.[9,10] The following years saw rapid growth in the application of industrial psychology in the area of market psychology by practitioners who wanted to address complex business problems. Among the tools those researchers deployed were psychological tests aimed at addressing the growing problem of identifying individuals who would be effective employees.

The Role of Scientific Management

The historical developments in management science and psychology that lead to the general acceptance and application of psychological testing are underexplored. One of the most influential pioneers of the late 19th and early 20th centuries was Frederic W. Taylor, who was an 1883 engineering graduate of the Stevens Institute of Technology and an employee of Midvale Steel Company. Taylor's influence began with the publication of his "A Piece-Rate System, Being a Step Toward Partial Solution of the Labor Problem" in 1895.

The article was a prescriptive piece that addressed industrial efficiency problems by scientifically analyzing work behaviors, establishing performance standards, and selecting laborers using scientific methods.[11] Taylor's model of scientific management allowed managers to use scientific principles to address the problem of soldiering (i.e., employees working at a contrived slow pace) and to establish job redesign and incentive motivation systems.[12]

Importantly, Taylor also suggested that a rational justification for employment policies was making wages contingent on meeting standards for job performance. The standards Taylor proposed were based on time and motion studies of optimal job performance. The idea was that tying payment to piece rate accelerated natural selection and that individuals who were best suited to a task would earn the highest wages while increasing productivity and lowering labor costs.[13]

Taylor thought that scientific management would usher in what he called the "mental revolution," and he advocated scientific selection and training as the principle for hiring, cooperation over individualism, and an equal division of work best suited to management and employees.[14,15] Taylor thought that efficiency started in the mind of the worker. In Taylor's system of HR management, workers must be motivated by incentives that are appropriately arranged to create drive and block soldiering. He held that managers could establish contextual rewards that reach the internal mental state

of the worker and channel it into productivity. Thus, the roots of applying scientific principles to the selection and other aspects of managing employees were established in both the practice of management and the university training of HR professionals in the early 1900s.[16]

After Taylor's death in 1915, his successors, including Herrington Emerson (founder of one of the first U.S. management consulting firms) and Frank Gilbreth (famous refiner of motion studies related to bricklaying), carried on the scientific management method and refined it by attempting to account for the mindset of workers and the psychological aspects of the worker–manager relationship.[17] Subsequently, the supporters of scientific management in industry and academia began to have closer alliances with psychology. Lillian Gilbreth's *The Psychology of Management* was an early bridge between the disciplines of management engineering and applied psychology. In 1919 Harlow Person was appointed managing director of the Taylor Society, and he, as scientific management's chief spokesperson, broadened the group's alliance with psychology to deal with the weaknesses of approaching the human element in management strictly through quantitative methods. These events stimulated a close relationship between HR selection and management and psychology that led to numerous psychologists publishing industrial psychology articles in the Taylor Society's journal.

Concerns about balancing business and industry needs for efficiency with workers' needs were thrust to the forefront as proponents and practitioners of scientific management began to discuss such constructs as "mental revolution," "natural selection," and "optimal productivity." The danger of seeking productivity and efficiency at the expense of treating workers humanely loomed as the potential of scientific management was increasingly applied to the workplace.

Scientific management became so popular in the early decades of the 20th century that governments began to use its principles in the military.[18] Opposition grew to this HR strategy, however. By 1911 union opposition was so great that labor denounced scientific management and called for strikes to combat it.[19] The U.S. Congress investigated the management system, and while laws limiting the application of statistics to the hiring, retention, and promotion of employees were considered, none were ever enacted.

The Roots of Psychological Testing

At the same time that this management revolution emphasizing the use of human engineering within the business and engineering communities was occurring, psychologists were applying scientific principles to business problems. And the first marketable application in psychology was the psychological test.

In order to market themselves to businesses during the early 1900s, psychologists began to describe themselves as "human engineers." Most specifically, psychologist wanted to solicit support for the use of tests for the scientific selection and evaluation of employees.[20]

The use of psychological testing in law and business were promoted by psychologists such as Hugo Munsterberg in the early 20th century.[21] A German immigrant who desired to make a positive impact upon American society, Munsterberg used popular media to take psychological testing out of the research laboratory and to the attention of industry and society.[22] By 1916 Walter Dill Scott became the first American academic to carry the title of professor of applied psychology, and students could get a graduate degree in applied psychology with private business support at Carnegie Technical Institute. Scott later headed the Committee on Classification of Personnel for the Army and developed rating scales for officer promotion. He also developed the U.S. Army's tests for skill assessment and established personnel departments in all of the Army's divisions.[23]

During 1916 the National Academy of Sciences created the National Research Council (NRC) to organize scientific support for the impending U.S. war effort. The NRC subcommittee, called the Committee of Psychology, was led by Robert Yerkes, who was then the president of the American Psychological Association. In the spring of 1917 the United States entered World War I, and a prominent group of Harvard University psychologists, including Yerkes and doctors Thorndike, Thurstone, and Otis postulated that the war effort could be helped by psychological methods to select, categorize, and make assignment and training decisions for troops.[24] Walter Dill Scott lobbied for the importance of placement testing for placing soldiers into jobs that matched their abilities. Scott and his committee developed 112 tests to place people in 83 different jobs for the military, and they administered their tests to about 3.5 million soldiers.

Although there was considerable reluctance by many in the military to accept the legitimacy of testing, the fact that the government budgeted for testing and accepted test results provided a degree of public validation of testing.[25] The wide use of psychological testing for selection and classification, motivation, and training decisions had begun by the end of World War I.

Psychological Testing After World War I

During the years between World War I and World War II, the business environment continued to evolve, and organizational complexity increased at the same rate as organizational size. The pressures organizations felt regarding competition and increased labor regulation provided even more impetus for the development of rational management systems and the application of scientific methods to improve performance. As a result, a number of individuals referred to by Van De Water as "entrepreneurial psychologists" attempted to address managers' and employees' needs by expanding the boundaries of psychology through self-promotion and the establishment of professional organizations, journals, and consulting services.[26]

One movement responsible for the marketing of psychological testing and the application of scientific and psychological principles to business problems originated in 1916, when G. Stanley Hall, John Wallace Baird, and Ludwig Reinhold Geissler founded the *Journal of Applied Psychology (JAP)*. During the first 12 years of that journal's

publication, business leaders were invited to participate, and many prestigious companies submitted material. By 1930, however, the practitioner content was largely replaced by empirical articles that critically examining a number of vocations and business practices, especially employee selection techniques. Several selection tools, including employment interviewing, letters of reference, character analysis, and photographs as employee selection instruments were discredited by studies reported in *JAP*. Psychological instruments were developed to address these problems.[27]

As psychologists used experimental studies and the scientific method to discredit competitors' instruments and to establish the value of their own instruments, standards for test development and use emerged. Also, recommendations for the training of industrial psychologists were developed, and test publishing companies like the Psychological Corporation appeared. Increasingly, industrial psychologists drew a clear distinction between industrial psychology and scientific management.[28] Psychologists emphasized the importance of individual human factors such as personality and intelligence as determinants of work behavior, in contrast to scientific management's focus on contextual factors such as incentive systems.[29] Time and motion studies were discredited by industrial psychologists who saw scientific management's failure to consider the human element in the workplace to be a critical weakness. They saw job performance as related to individual differences in satisfaction, personality, or intelligence, all of which could be measured by psychological techniques.[30] With this shift in paradigms, psychologists attempted to seize the high scientific ground of developing, evaluating, and validating employee selection and placement techniques and instruments.

World War II and Formal Military and Industrial and Organizational Psychology

At the start of World War II, the U.S. military, having considerable experience with psychological testing during wartime selection and placement processes, set up the personnel testing section of the National Guard's Army Adjunct General's Office. The federal government also set up the NRC Emergency Committee on Psychology and its subcommittee, the Committee on Service Personnel Selection and Training, as well as the Army Air Force Aviation Psychology Program.[31] During the war, military psychology and psychological services were firmly established as essential to the nation's defense efforts. By the early 1940s, psychologists were able to assess and validate the techniques of classification and training, and significant advances were made in the analysis of the role of human factors in the design and operation of equipment, job performance evaluation, testing, training technology, and adaptation to special environments. In 1946 the American Psychological Association established the Division of Military Psychology (Division 19) to create a forum for military research and to advance psychology in the military.

The capacity of psychological tests to find and predict merit was well documented by military psychologists in the United States and other countries by the 1940s.[32,33] Because of the successes of psychology during World War II, Congress established the

Office of Naval Research to support scientific research.[34] The National Science Foundation was established in 1950 to provide a continued federal research effort, and the, and the U.S. Air Force eventually merged several programs in 1954 into the Air Force Personnel and Training Research Center, which became the Air Force Human Resources Laboratory in 1968.[35] The Personnel Research Section of the Army Adjutant General's Office evolved into the current Army Research Institute for the Behavioral Sciences in 1972.

The need to classify and select large numbers of recruits for military service led, in 1940, to the formation of the Committee on Classification of Military Personnel. The committee was established to work with the adjutant general's personnel testing section.

The development and dissemination of the Army General Classification Test to replace the U. S. Army's system of alpha and beta developed in World War I was a major development in personnel selection and classification testing. Psychologists developed aptitude tests and tests of special skills, developed assessment center techniques, and set the stage for the later development of the Armed Forces Qualification Test (AFQT) and the Armed Services Vocational Aptitude Battery (ASVAB).[36] In what became the nation's largest personnel system—processing over 800,000 recruits annually—psychological tests for justifying selection, placement, and training decisions became institutionalized and accepted by the 1950s.

Personality Testing: A Field in Search of Respect

The disparate fields of psychology, engineering, and management eventually merged to address the practical application of their respective fields to organizational problems. However, the acceptance of psychological testing and that measure's successful application to organizational issues was not uniform across all areas. While some forms of psychological testing gained wide acceptance and public support, other forms of testing did not. For example, the utility of cognitive ability tests in selection is well established, and one can make the case that the very precise effectiveness in these tests and their ability to predict job skill acquisition and certain types of performance on an individual and reference group basis is one of the reasons for such careful regulation of these tools. The economic value of using these selection instruments has been well established, with research indicating that high selection cut of scores on valid selection tools can identify superior workers that produce outcomes that are as high as 48 percentage points higher than the average categorical worker on outcome measures for managerial or professional positions.[37]

Personality tests are a somewhat different story. The use of these tests in employment selection is much more controversial. In contrast to cognitive tests, the prevailing view of personality testing in personnel selection is that it lacks validity, that the tests are easily faked, and that the tests are generally unsuitable for preemployment screening. Blinkorn and Johnson concluded that the generally low validities of personality measures and the problem of faking make it difficult to recommend personality measures as an alternative in employment selection.[38]

Many of the problems in personality testing stem from historical controversies over the essence of personality, its definition, the descriptions and measures of personality traits, and how personality traits interact with behavior and with each other. Prior to the development of the Big Five personality models, general agreement on the dimensions of personality was lacking.[39] Indeed the *Handbook of Industrial and Organization Psychology*, in its 1976 chapter on personality, describes a confusing set of motivation models, trait theories, and personality instruments originating from Hippocrates and continuing to the 1960s. While an examination of these models and theories is far beyond the scope of this article, the ideas' range and breadth serve to underscore the problems in defining suitable personality measures for selection purposes. Indeed, the textbook chapter provides a list of more than 30 personality instruments, including brief and long self-report measures, measures of values, vocational interest measures, and projective techniques.[40] The problem is that many of these measures are clinical or developmental instruments inappropriately used in personnel selection, while others have not demonstrated sufficient reliability or validity to be adequate as selection measures.[41]

Thus, the usefulness of personality testing in selection has traditionally been a source of controversy subject to widely varying opinions.[42] While common sense tells us that personality should influence performance, and studies show that there is fairly consistent agreement on the sets of personality traits commonly possessed by successful managers, historical reviews of the research exploring the validity of personality testing has generally pessimistically concluded that personality testing has little utility.[43,44] Recent research in personality testing has altered these conclusions, and there seems to be considerably more optimism about the role of personality testing in selection.[45]

In Parts II and III of this series, the development of psychological testing and the role of personality testing in selection are further explored. The second article will describe refinements in the methods used to evaluate selection success and explore the emerging post-Title VII issues related to selection fairness and testing-induced discrimination in the form of adverse impact. The third article will focus on recent developments in personality testing and its utility as a selection tool.

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