Industrial–Organizational Psychology: Science and Practice

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Abstract

Industrial and organizational (I–O) psychology is the study of the behavior of men and women in work settings. I–O psychologists seek to understand and optimize the effectiveness, health, and well-being both of individuals and of organizations. This article considers the three major areas that comprise the broad domain of the field (personnel psychology, organizational psychology, and human engineering); an overview of the evolution of the field; the scientist–practitioner model and the role of research in guiding science and practice; and finally, factors that are driving demand for research and expertise in I–O psychology.

This article is divided into four main sections. The objective of the first section is to describe the domain of industrial and organizational (I–O) psychology, three major focal areas that comprise it, and to identify typical settings where I–O psychologists work. The second section presents an overview of the evolution of I–O: How the field developed to where it is today. The third section presents the scientist–practitioner model and the role of research in I–O psychological science and in practice. Finally, the fourth section identifies several key factors that are driving the growing demand for research and expertise in I–O psychology.

The Domain of I–O Psychology

Psychology is the scientific study of behavior. I–O psychologists focus on a key aspect behavior, namely, the behavior of men and women in work settings. This brief definition suggests three broad areas that comprise the domain of I–O psychology, the person (i.e., the worker), the work that is performed, and the context in which the work is performed (Zedeck, 2011).

With respect to context, the term 'work setting' may extend far beyond work, and with it, the domain of (I–O) psychology. While most of our lives are spent at work, what happens at work can have a huge impact on people and their families. Likewise, what happens while people are away from work, or in a family setting, can have a significant impact on one's behavior at work. Consider just one example of such 'spillover', the care of children. Research shows that men are taking more overall responsibility for the care of their children (providing one-on-one care, as well as managing childcare arrangements), according to themselves and their wives/partners. This has led to increased work-life conflict, as 59% of fathers in dual-earner couples report experiencing some or a lot of conflict today, up from 35% in 1977 (Aumann and Galinsky, 2009; Halpern and Murphy, 2005).

The influence of personality on the behavior of men and women in work settings is even more significant, because personality is often influenced by events that took place long before an individual began employment. Personality traits relevant to organizations are those psychological characteristics that predict consistent work-related thoughts, motivations, behavior, and other outcomes across situations and over time. Not surprisingly therefore, personality characteristics (e.g., emotional stability, extroversion, conscientiousness, agreeableness, openness) predict important outcomes, such as occupational attainment and advancement, overall managerial effectiveness, the performance of expatriates, learning and skill acquisition during training, counterproductive work behaviors, team cohesion and teamwork, and job and career satisfaction (Oswald and Hough, 2011).

I–O psychologists seek to understand and optimize the effectiveness, health, and well-being, both of individuals and of organizations (Rogelberg, 2007). With respect to individuals, I–O psychology seeks to understand the reasons for behavior, as well as intentions, attitudes, emotions, motives, values, and beliefs in work settings. It also seeks to understand, and to some extent to predict, how people can become effective, satisfied, engaged in their work, committed to it, fulfilled, and rewarded, and how these outcomes can be maintained. With respect to organizations, that is, collections of people working together in a division of labor to achieve a common purpose (Hitt et al., 2011), I–O psychology seeks to understand how they can be sustained and developed. I–O psychology therefore focuses on interactions between people and the settings in which they work in order to gain a deeper understanding of how their behavior can be influenced and enhanced to benefit the individual, the organization, and society as a whole. I–O psychology examines issues at the individual level, at the level of groups or teams, and also at the broader organizational level. It is therefore a multilevel and multiattribute study of behavior (Zedeck, 2011).

Traditionally, I–O psychology has been divided into three major areas: personnel psychology, organizational psychology, and human engineering. The following sections briefly consider each of these. Although we treat them separately, they often overlap considerably.

Personnel Psychology

Personnel psychology is a subfield within I–O psychology. It is an applied discipline that focuses on individual differences in behavior and job performance and on methods of measuring

and predicting such differences. Some of the major areas of interest to personnel psychologists include job analysis and job evaluation; recruitment, screening, and selection; training and development; and performance management.

Job analysis is the study of the work to be done and the personal characteristics necessary to do the work. Job evaluation is the process of rank-ordering jobs in terms of their relative worth to an organization. Recruitment is a set of activities designed to attract talent to an organization. It may be internal to a firm (e.g., across departments or functional areas) or external (e.g., job fairs, university recruiting, company and specialized Web sites, social media). In the hiring process, screening refers to a rough, initial examination (e.g., based on minimum qualifications) designed to identify candidates for further consideration. Selection may involve a variety of methods and instruments, such as interviews, written or performance tests, personality measures, biographical information, reference checks, or background checks. In selecting among applicants for jobs, personnel psychologists are concerned with developing valid and reliable assessment methods that are fair to members of all groups. Their objective is to select applicants who are predicted to perform well on the job. Training and development activities involve learning experiences, planned by the organization, and designed to improve performance at the individual team, or organizational levels. Methods may include, for example, formal classroom instruction, online training, on-the-job training, outdoor training, role-playing exercises, team building, or behavioral simulations. Finally, performance management is a continuous process of identifying, measuring, and developing the performance of individuals and teams, and of aligning performance with the strategic goals of an organization (Cascio and Aguinis, 2011).

Personnel psychology also represents the overlap between psychology and human resource management (HRM). HRM is concerned with the management of staffing, retention, development, adjustment, and change in order to achieve both individual and organizational objectives (Cascio, 2013). As a subfield of HRM, personnel psychology excludes, for example, such topics as labor and compensation law, organization theory, industrial medicine, collective bargaining, and employee benefits. Psychologists have already made substantial contributions to the field of HRM; in fact, most of the empirical knowledge available in such areas as motivation, leadership, staffing, and performance management is due to their work.

Organizational Psychology

Organizational psychology addresses the motivational and emotional side of work. To do that, it typically combines research and ideas from social psychology (the study of power and influence, attitudes and attitude change, communication in groups, and individual and group social behavior) with organizational behavior (a field devoted to understanding, explaining, and ultimately improving the attitudes and behavior of individuals and groups in organizations) (Colquitt et al., 2011).

Organizational psychology typically includes topics such as aging and retirement, turnover, retention, attitudes (e.g., job satisfaction, organizational commitment, employee engagement), fairness, organizational justice, motivation, decision making, stress, leadership, teams, the interaction of work with family (and vice versa), as well as organizational and work design. Managing change is also a key focus within organizational psychology. Such changes may stem from a variety of initiatives, such as mergers and acquisitions, restructuring, downsizing, or various efforts to enhance productivity and quality. For change-management initiatives to be effective, I–O psychologists need to understand thoroughly the theoretical bases for the interventions they use, as well as research to assess the impact of the interventions on people and organizations.

Human Engineering

Human engineering (also known as human factors psychology or engineering psychology) is the study of the capacities and limitations of people with respect to their work environments. The goal is to develop an environment that is compatible with the worker, whether that worker is a pilot interacting with the controls and displays in an airplane cockpit, a computer user navigating a graphical user interface, or a truck driver who uses controls and displays to operate a vehicle.

In a systems approach to human engineering, the human operator is the central figure within a complex sociotechnical system. That system is composed of the operator, the technology (e.g., tools, computers) necessary to complete the required tasks, and the work environment (the organization, physical setting, and task requirements). One approach to system design has been the sociotechnical systems approach, in which design is driven by analysis of the environment, the social system, and the technology system. The objective is to maximize the fit among all three components (Paley and Grier, 2007; Salvendy, 2006).

More recently, human engineering, like much of psychology, has been greatly influenced by advances in cognitive science. To appreciate this, consider two other approaches to system design: user-centered design and participatory ergonomics. With user-centered design, the primary objective is to design systems that explicitly satisfy both the task and information-processing requirements of the human operator. Participatory ergonomics incorporates user involvement throughout the design process, but it goes further, allowing users, with expert support, to complete the design.

Cognitive–perceptual principles guide the design of user interfaces, the primary means by which users interact with systems. As an example, consider the design of a control panel in a power plant. Here are four such principles (Paley and Grier, 2007):

- Logical groupings of displays,
- Consistency of look and function (like items look and function similarly),
- Labels are legible, visible, meaningful, and discriminable, and
- Controls are reachable and movable by the population in the work environment.

Clearly, user-interface designs and system designs can have a major impact on the fit between humans and the environments in which they work.

Having reviewed the broad domain of I–O psychology, it should come as no surprise that I–O psychologists work in a variety of settings (Society for Industrial and Organizational Psychology, Inc., 2014). In academia, they may be full, associate, or assistant professors of psychology, management, organizational behavior, or industrial relations. In other settings they may hold the titles of corporate vice president, director, manager, or staff member of organizational development, management development, human resources research, employee relations, training and development, or leadership development. Finally, they may be presidents, vice presidents, or directors of private research organizations, consulting companies, or other organizations.

A Brief Overview of the Evolution of I–O Psychology

The objective of early industrial psychology was to improve organizational goals (productivity and efficiency), primarily by applying psychology with an emphasis on individual differences through employee selection and training (Koppes, 2007). In 1913, Hugo Munsterberg's book, *Psychology and Industrial Efficiency*, described experiments in selecting streetcar operators, ship's officers, and telephone switchboard operators. His contributions to I–O psychology are noteworthy for his emphasis on the analysis of jobs in terms of (1) the abilities required to do them and (2) the development of testing devices – aptitude as well as work sample tests – that were able to forecast subsequent job performance (Munsterberg, 1913).

Munsterberg's 1917 book, *Business Psychology*, included the results of questionnaires sent to hundreds of laborers. The questionnaires requested anonymous data on attitudes toward their work, involvement in the labor movement, and leisure activities.

Several decades earlier, the scientific management movement began with the goal of bringing order and rationality to the practice of management. Frederick Winslow Taylor was the prophet of scientific management, and the stopwatch was his 'bible' (Bell, 1972). Taylor began his experiments in the steel industry in 1885. His objective was the systematic analysis and breakdown of work into its smallest mechanical elements, and then their rearrangement into the most efficient combination. The objective was to identify the 'one best way' to perform work. In addition to the scientific study of the task itself ('time and motion' study), Taylor argued that individuals selected to do the work should be as perfectly matched physically and mentally to the demands of the job as possible, and that overqualified individuals should be excluded.

Taylor believed that employees should be trained carefully by supervisors (whose own work was also divided into specialties) to ensure that they perform the work exactly as specified by prior scientific analysis. In no case, however, should employees ever be called upon to work at a pace that would be detrimental to their health.

Finally, to provide an incentive for the employee to follow the detailed procedures specified (and closely supervised by line supervisors on the shop floor), Taylor felt that employees should receive an addition of between 30 and 100% of their ordinary wages when the task was done right and within the time limits specified. The first piece-rate incentive system had arrived.

Taylor was interested in the social aspects of work, although he saw little good emerging from the social interaction within work groups. He felt that work groups fostered a level of individual efficiency equal to the level of the least productive worker in the group. In other words, he believed that the efficiency of the group would not be any greater than the efficiency of the least productive member. Thus, Taylor tried to institute a kind of social physics into the workplace.

Both Munsterberg and Taylor were concerned with how workers were selected for jobs, as well as with the individual worker's feelings and aspirations. Although they differed on several issues (notably, on how social structure affected productivity), Munsterberg's writings clearly suggest that he felt that the two emerging fields of personnel selection and social psychology (the study of how people affect and are affected by one another) were complementary (Landy, 1992; Moskowitz, 1977).

When the United States entered World War I in 1917, psychologists Walter Dill Scott, Walter VanDyke Bingham, and Robert Yerkes collaborated in developing intelligence tests that could be used to select and classify recruits. The Army Alpha was administered to individuals with English language skills, while the Army Beta was administered to recruits who were illiterate or did not have strong English language skills. These tests paved the way for large-scale intelligence testing and for later expansion of psychological testing into government, industry, and education (Vinchur and Koppes, 2011).

Other developments at about the same time included the use of rating sheets for interviewers, advances in checking references given by workers, and in statistical methods for estimating validity (the extent to which selection devices accurately forecast job performance). Other kinds of psychological measures also appeared during and after World War I, such as measures of aptitude, interest, and personality. The measurement of attitudes was made possible by the scaling techniques of L.L. Thurstone in 1927, and improved further by Rensis Likert in 1932. Likert-type rating scales (e.g., 'strongly agree, agree, neither agree nor disagree, disagree, strongly disagree') are still popular today.

The Hawthorne Experiments

In Chicago, in 1923, the Hawthorne Works of the Western Electric Company provided the setting for one of the most famous behavioral research efforts of all time. The purpose of the research was to identify variables that affect worker productivity. Experiments by professors Elton Mayo, Fritz Roethlisberger, and T. North Whitehead of Harvard Business School indicated that productivity was directly related to the degree of group teamwork and cooperation. The level of teamwork and cooperation, in turn, seemed to be related to the interest of the supervisor and the researchers in the work group, the lack of coercive approaches to productivity improvement, and the participation afforded the workers in changes affecting them (Pennock, 1930; Roethlisberger and Dickson, 1939). In short, the researchers came to view an organization of workers as a *social system*, in contrast to Taylor's view of an organization as a *technical–economic system*. Interest and research in topics such as leadership, motivation, group processes, and job

satisfaction have direct antecedents in the Hawthorne research (Vinchur and Koppes, 2011).

World War II brought new challenges for I–O psychology, and also many new developments. These included the Army General Classification Test, situational stress tests, and the selection and simulation training of pilots to fly warplanes. In addition, building on work done by German psychologists and that of the War Office Selection Board of the British army in the early 1940s, the US Office of Strategic Services used the assessment center method to select spies and sabotage agents during World War II. Each candidate had to develop a cover story that would hide his identity during the assessment. Testing for the ability to maintain cover was crucial, and ingenious situational tests were designed to seduce candidates into breaking cover (McKinnon, 1975; Office of Strategic Services, 1948).

Post–World War II, the US economy thrived, jobs were plentiful, and developments in I–O psychology focused on job analysis, job evaluation, staffing, training, performance appraisal, labor relations, equipment design, and reducing accidents to enhance safety. The conviction that group behavior and workers' feelings were associated with morale and productivity characterized much of the research and theorizing in what became known as the 'human relations movement' for the next two decades. Influential thinkers such as Douglas McGregor (Theory X and Theory Y managers), Chris Argyris (modern organizations are in conflict with the personalities of mature adults), and Rensis Likert (the 'linking pin' model of integrating small groups into the organization) focused on the fit between organizations and individuals. Their ideas can be summed up concisely: organizations and people need each other, and a good fit between the two benefits both (Shafritz and Ott, 1996).

The 1960s and 1970s

The Vietnam War, baby boomers in the workplace, and the rise of foreign competition led a new generation of employees to question the authority of organizations, which stimulated concerns about democracy, discrimination, and autonomy in the workplace. Major civil rights legislation was passed, including the 1963 Equal Pay Act (outlawing gender-based discrimination in pay); the 1964 Civil Rights Act (Title VII of which prohibited discrimination in employment on the basis of race, color, religion, sex, or national origin); and the Age Discrimination in Employment Act (which forbids discrimination against employees 40 years of age and over). This legislation coupled with major court decisions, such as *Griggs v. Duke Power Company* (1971), significantly influenced research in I–O psychology concerned with job analysis, test validation, and fair employment practices. After publication of the federal *Uniform Guidelines on Employee Selection Procedures* (1978), I–O psychologists became heavily involved in defending (or challenging) tools and techniques used for personnel decisions. Validity generalization (see below) and meta-analysis were introduced as approaches to support generalizing the findings of validity studies across jobs and organizations. At the same time, cognitive-based theories began to emerge in areas such as leadership and motivation. Finally, in 1976 Marvin Dunnete published a one-volume *Handbook of Industrial and*

Organizational Psychology to chronicle the evolution, development, and future challenges facing the field.

From the 1980s Forward

With the fall of Communism, the end of the Cold War, and the passage of the North American Free Trade Agreement, a global and diverse workforce began to emerge. Downsizing white-collar workers became more common, along with the widespread restructuring of organizations (also known as process reengineering), and mergers and acquisitions. Passage of the Americans with Disabilities Act (ADA) in 1990 created the need to identify essential job functions, physical requirements of jobs, and brought renewed interest in job design. Likewise, passage of the Civil Rights Act of 1991, which amended the Civil Rights Act of 1964, provided the sanctions for violations of the ADA and outlawed the practice of 'race norming'. Using that procedure, percentile scores on a selection procedure were computed relative to one's own race/ethnic group, and then merged with those from other race/ethnic groups into a single list. The prohibition against race norming subsequently sparked renewed interest in research on fair personnel decisions.

Over the past 30 years, there have been many developments in I–O psychology research and practice. Some of these include, for example, a cognitive perspective on performance appraisals; a shift toward performance management (which incorporates ongoing coaching and feedback); organizational justice theory; the use of personality tests in employment; computerized adaptive testing; and widespread use of the Internet and social media for recruitment, assessment, and selection. Two other noteworthy developments were the Occupational Information Network to replace the former Dictionary of Occupational Titles, the second edition of the four-volume *Handbook of Industrial and Organizational Psychology* in 1991, and, more recently, a three-volume *APA Handbook of Industrial and Organizational Psychology* in 2011.

The Scientist–Practitioner Model and the Role of Research in Guiding Science and Practice

There is a strong connection between research that is conducted using scientific methods and the practice of I–O psychology. For decades, the professional association for I–O psychologists, namely, the Society for Industrial and Organizational Psychology, has endorsed the scientist–practitioner model (Bass, 1974; Cascio and Greene, 2012; Dunnette, 1990; Murphy and Saal, 1990; Rupp and Beal, 2007). That model discourages both practice that has no scientific basis and research that has no clear implications for practice.

I–O psychology is an applied discipline, as reflected in the title of the premier journal in the field, *Journal of Applied Psychology*. At the same time, however, what differentiates I–O psychology from many other applied disciplines is its reliance on scientific methods to produce basic research and theory. That basic research and theory often lead to strategies and systems that are relevant to individuals, teams, organizations, and society. As an example, consider the theory of validity generalization (VG).

A traditional belief among personnel psychologists was that validity coefficients, that is, correlations of scores on preemployment tests with measures of job performance, were highly specific to each employment situation. Hence, an empirical study would be required in each situation, and the ability to generalize validities across similar situations would not be possible.

Schmidt and Hunter (1977) and Hunter and Schmidt (1990) hypothesized that the variability across studies in raw validity coefficients, even when jobs and tests appear to be similar or essentially identical, might be artifactual in nature. In developing a model to test this hypothesis they identified seven potential sources of artifactual, between-study variance in observed validity coefficients, the most important of which is sampling error. Applying a Bayesian statistical model, they demonstrated that when jobs are similar in different employment situations, it is possible to generalize validity to new settings without carrying out an empirical validation study in each new setting.

The more than 500 VG studies and technical refinements of VG procedures that now exist in the literature in applied psychology (for reviews see Murphy, 2003; Schmidt and Hunter, 2003) provide disconfirming evidence that validity is situationally specific, and indicate that VG is a robust phenomenon. Perhaps the most important implication of this work is that it has called attention to the fact that the mean of several validity coefficients may be a better basis for inferring a valid relationship between a predictor (e.g., an employment test) and a criterion (a measure of job performance) than any one coefficient (Society for Industrial and Organizational Psychology, Inc., 2003).

The implications of VG research have direct implications for practice, and several authors have identified key considerations for practitioners to consider when assessing VG evidence (Schmitt, 1996; Wanous et al., 1989). The many studies that VG has enabled have made it possible to develop general principles and theories that have helped to propel the field beyond a mere technology to the status of a science (Guion, 1976).

Some Factors Driving Demand for Research and Expertise in I–O Psychology

Dramatic changes are occurring in the social, legal, political, and economic environments everywhere. Some of these issues include finding and keeping top talent in tight labor markets, and capitalizing on the information revolution in ways that will benefit organizations, such as social media and other Internet-based recruitment sources. Other challenges include managing the performance of geographically dispersed employees and teams (virtual teams), and providing training and development opportunities on demand.

Many of the ways of working that individuals have taken for granted are disappearing – working 9–5, spending an entire career with only one company, or working in an office everyday. Similar changes are happening in organizations. For example, the idea that hierarchy is the best way to manage information flows, that most people will work with team members in the same office, or that the majority of talent will be held within the boundaries of an organization. All of this is shifting, and what is coming in its place is less knowable and less understandable – accelerating developments in technology, accelerating globalization, accelerating demographic changes, and accelerating social trends (Cascio and Aguinis, 2008; Gratton, 2011).

Indeed, this is today's paradigm of work: anytime, anywhere, in real space, or in cyberspace. This presents ongoing challenges in areas such as work-life fit; developing a total rewards package that will attract, retain, and motivate employees at all levels; measuring social networks to identify trusted connections; promoting collective leadership; and promoting and enabling ambidextrous leadership that will identify new growth businesses, while remaining focused on the execution of existing ones (Cascio and Boudreau, 2011). I–O psychology will contribute to the bottom-line success of organizations and to the betterment of employee welfare by developing research-based responses to the workplace challenges wrought by this new paradigm.

See also: Attitude Measurement; Family and Work; Female Power at Work; Five Factor Model of Personality, Assessment of; Human Cognition, Evolution of; Human Factors and Ergonomics; Human Resource Management, Psychology of; Law: History of Its Relation to the Social Sciences; Personality and Values at Work; Personnel Selection, Psychology of; Technology and Organization; Work Motivation.

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