Solving the **Supreme Problem**: 100 Years of Selection and Recruitment at the *Journal of Applied Psychology*

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This article reviews 100 years of research on recruitment and selection published in the *Journal of Applied Psychology*. Recruitment and selection research has been present in the Journal from the very first issue, where Hall (1917) suggested that the challenge of recruitment and selection was the *Supreme Problem* facing the field of applied psychology. As this article shows, the various topics related to recruitment and selection have ebbed and flowed over the years in response to business, legal, and societal changes, but this *Supreme Problem* has captivated the attention of scientist–practitioners for a century. Our review starts by identifying the practical challenges and macro forces that shaped the sciences of recruitment and selection and helped to define the research questions the field has addressed. We then describe the evolution of recruitment and selection research and the ways the resulting scientific advancements have contributed to staffing practices. We conclude with speculations on how recruitment and selection research may proceed in the future. Supplemental material posted online provides additional depth by including a summary of practice challenges and scientific advancements that affected the direction of selection and recruitment research and an outline of seminal articles published in the Journal and corresponding time line. The 100-year anniversary of the *Journal of Applied Psychology* is very much the celebration of recruitment and selection research, although predictions about the future suggest there is still much exciting work to be done.

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The history of the *Journal of Applied Psychology* (*JAP*) is very much the history of selection and recruitment. In fact, the first article ever published in *JAP* devoted most of its discussion to selection (Hall, Baird, & Geissler, 1917). The authors were preoccupied with the importance of selection and classification based on what they called “mental equipment” (i.e., individual differences): “The problem is so far-reaching that one finds it difficult to determine whether the burden of its significance attaches to its psychological, its economic, or its social aspects” (Hall et al., 1917, p. 6). In the second article in the same issue, Hall (1917, p. 12) made broad reference to selection and called it the *Supreme Problem*: “...the supreme problem of diagnosing each individual, and steering him toward his fittest place, which is really the culminating problem of efficiency, because human capacities are after all the chief national resources.” And remarkably, the third article (Terman et al., 1917) focused entirely on the use of psychological assessments for the selection of police and firefighters. Applied psychology grew from a desire to make the world a better place, and selection was the field in which the movement gained traction.1

Selection was and remains the *Supreme Problem* of applied psychologists. Selection has historically been operationalized as a predictive hypothesis linking individual knowledge, skills, abilities, and other characteristics (KSAOs) to individual outcomes, such as job performance and turnover (Guion, 1965). The predictive hypothesis is simple: Hire those with the highest scores on measures of the KSAOs critical for effective performance on the job. Establishing the evidence needed to operationalize, test, and apply this hypothesis is not simple. For example, selection is dependent on the existence of a pool of potential candidates (Taylor & Russell, 1939). Hence, the field of recruitment developed to focus on identifying people who are likely to have the necessary KSAOs and attracting them, so that they will apply to firms and those who possess the prerequisite KSAOs can be

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1 It is interesting to observe that these themes—psychological, economic, and social—remain (to varying degrees) consistently intermingled over the 100 years of selection and recruitment research.
selected. Recruitment is the “attraction hypothesis” that is the precursor to the “predictive hypothesis.” Recruitment and selection are thus interrelated, but recruitment is the feeder into selection (Schneider, 1987).

The purpose of this article is to celebrate a century of research on selection and recruitment that has been published in JAP. This is a selective review because it privileges research published within JAP. However, given JAP’s leadership role in the field of applied psychology, a review of selection and recruitment research published in JAP is essentially a review of thought leadership within the community of selection and recruitment scholars. The review does not attempt to discuss every article related to selection and recruitment that was published in the Journal over the last 100 years. Instead, the goal of this article is to provide a broad summary of how selection and recruitment research has evolved within JAP since the Journal’s inception in 1917. We identify major practice issues that contributed to what the Journal published and the ways the Journal’s publications helped shape practice. We highlight examples of noteworthy contributions; articles that defined the field; and various trends, ebbs, and flows of scholarship for the last 100 years. The way we identified these exemplary contributions was based on our collective judgment. We did not calculate interrater reliability and agreement indices because we did not code the articles according to any precise criteria.

In the sections that follow, we first summarize the practice trends that have occurred over time and then use these trends to understand the evolution of recruitment and selection research. Having such a long view to the past helps one make reasonable speculations about the future, so we conclude with a brief discussion of the major issues (both applied and research issues) we expect the field to confront and address in the next several decades.

Summary of Practice Challenges Shaping Selection and Recruitment

Articles published in the first issue of JAP noted that applied psychology was finally in a place to become a legitimate science and was no longer inferior to what these authors called “pure science” (Geissler, 1917; Hall, 1917; Hall et al., 1917). For example, Hall (1917, p. 12) questioned: “Must we not, therefore, infer that such facts as these suggest that we read just the old differentiation between pure and applied psychology, and realize that research in the latter field may be just as scientific as in any other, and that the immediate utility of our results is at least no longer a brand of scientific inferiority?” What distinguished this new scientific field of applied psychology was recognition that pressing practical challenges were not directly being addressed by the more “pure” or what we today call “basic” areas of psychology. Science could benefit practice, and practice could benefit science. Indeed, throughout the last 100 years, what has made applied psychology so dynamic and vibrant has been its close connection to business and industry. However, this linkage may not always be obvious, and the strength of the relationship can be a source of some concern for those interested in maintaining a healthy scientist-practitioner model of organizational psychology research and practice.

Changes in business, economics, the legal and political environment, and societal systems have shaped the trajectory of selection and recruitment research. In terms of business challenges, business and industry in the first two thirds of the twentieth century created specialized and relatively distinct jobs (e.g., factory employees in different positions involving specific work activities). The task for recruitment and selection in many organizations was one of identifying the KSAOs needed in each job and then hiring people with those KSAOs. However, as work became increasingly knowledge-based and even more specialized, the number of qualified applicants in many fields decreased, and competition for those candidates with advanced skills and training contributed to job mobility and created a greater need to understand how to source and attract top candidates (i.e., recruitment). In addition, many jobs now encompass a wide range of work activities and require a much greater degree of interdependence with coworkers. Thus, some firms now hire based on a broad set of KSAOs required to perform all of the work activities for a number of jobs in a job family, the ability to acquire new knowledge and skills related to the job family, and personal characteristics related to effective interactions with others.

The enormous changes in politics, societal attitudes, and the laws related to employment have fundamentally redefined the nature of selection and recruitment and also created important boundaries between what are considered lawful and unlawful practices. Passage of the 1964 Civil Rights Act in the United States made employment discrimination based on protected group status unlawful and gave the Equal Employment Opportunity Commission (EEOC) authority to monitor such activity. The simultaneous rise of employment litigation (with corresponding use of adverse impact statistics to operationalize discrimination) and recognition of moderate to large racial and sex-based subgroup differences on many predictors led researchers to strive for ways to balance the goals of validity and diversity. At the same time, affirmative action requirements encouraged employers to change their recruitment practices and seek out members of protected classes. Finally, short of the legal context, nothing has affected selection and recruitment as much as war. World War I and World War II created a need for selection and classification research on an unprecedented scale.

Supplemental Appendix A (available online in supplemental materials) provides a summary of practice challenges and scientific developments that shaped the nature of selection and recruitment research. Supplemental Appendix B offers a detailed timeline of research publications. The articles listed in supplemental Appendix B resulted from a reading of all article titles and abstracts and, in many cases, portions of the articles. Our attempt was to identify changes in the nature of problems explored in JAP articles or new approaches to the study of problems. The reason for including an article is provided in the “Comment” column of the appendix. The articles referenced in that table are not necessarily the best or even the most influential articles on the topics addressed; nearly always, subsequent research on the topic went well beyond the article cited in providing understanding of the issue(s). One of the authors did the initial work on this appendix; the other two authors reviewed the appendix, added some articles, and

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2 In 1978, Executive Order 12086 gave the Office of Federal Contract Compliance Programs (OFCCP) the authority to monitor compliance with Executive Order 11246, as amended; Section 503 of the Rehabilitation Act of 1973, as amended; and the Vietnam Era Veterans’ Readjustment Assistance Act of 1974, as amended; of federal contractors.
deleted others when appropriate. The end result represents our collective judgment about what represents a substantive change in the topic or emphasis placed on an area. Supplemental Appendix C concludes the article with speculations about future research needs in the areas of recruitment and selection. We now turn to examine how recruitment and selection research published in *JAP* has reflected these changes in business, economics, the legal and political environment, and societal systems.

**Recruitment Research in JAP**

Recruitment refers to a broad set of activities that connect applicants to organizations and their jobs. Applicants may be active (i.e., currently looking for or applying to new jobs) or passive (i.e., open to new employment opportunities but not actively looking), and internal (looking for new job opportunities within one’s existing firm) or external (looking for new job opportunities at a different firm). Recruitment is a process that occurs over time and comprises different stages, starting with the generating and sourcing of active or passive candidates who may become future applicants, to maintaining active applicants who have applied to the firm, and ending with influencing *job choice decisions* (e.g., Barber, 1998). The field of recruitment is broad and overlaps with several other literatures, including selection, classification, job choice, vocational choice, promotion and succession planning, turnover, and person–environment (PE) fit. However, at its core, recruitment is about finding and putting the right person in the right job at the right time and place to enable firms to implement strategy and create competitive advantage. Therefore, this review will focus on research published in *JAP* primarily from the perspective of organizational recruitment, and job choice and attractiveness perceptions held by applicants.

**Early Recruitment Research in JAP**

The first article in *JAP* that referred to recruitment appeared in the fourth and last issue of the Journal’s first year (Anonymous, 1917). The article did not have an author and was simply titled, “A note on the German recruiting system.” This article had more to do with the selection and training of recruits into the German military than it did with recruitment, and it was likely published because of concerns about World War I in Europe and the United States’ impending entry into the war. Beyond that one article, there was little published in *JAP* for almost 50 years that had much to do with recruitment. This most likely occurred because World Wars I and II created an abundance of skilled workers, and society placed a great deal of value on strong loyalty to a single employer; hence the *Supreme Problem* was primarily concerned with selection challenges (see supplemental Appendix A for more details). However, there were a few notable exceptions. Kerr (1943) examined electrical employees’ preference for music while at work. This article did not directly examine applicants’ desires, but it at least considered the implications for recruitment. This article is quite possibly the first to question whether the work environment could influence job choice. Bendig and Stillman (1958) continued this line of work but examined a broader range of job characteristics (e.g., opportunity to learn new skills, job security) and importantly, considered the desirability of these characteristics from the perspective of future applicants (college students). This article is noteworthy for two reasons. First, the focus on job and work characteristics that affect applicants’ perceptions of job attractiveness and their job choice foreshadows research that would not reappear until the 1980s. Second, it studied college students, which at the time was considered quite novel: “Our interest is in isolating such dimensions of job incentives among groups of undergraduate college students as an unexplored research area related to occupational choice among students. . . .” This comment is interesting given that an overreliance on college students as subjects would become a concern of later recruitment research (e.g., Breaugh, 2013). Another noteworthy article was authored by Weitz (1956), who conducted a field experiment on applicants to estimate the effects of job expectations on turnover for life insurance agents. This article appears to be the first that examined applicants’ “realistic job concept,” a precursor to the realistic job preview (RJP).

In the 1970s, business and societal changes led to more specialized skills and increased employee mobility. Because of the challenges in finding and attracting capable candidates, recruitment research began to be published more frequently and gain programmatic momentum. There were three main areas of focus. The first concentrated on the recruitment interview (i.e., interviews designed primarily to attract applicants to a firm) and the factors that influenced either applicant or interviewer responses to the interview (e.g., Alderfer & McCord, 1970; Cohen & Bunker, 1975; Schmitt & Coyle, 1976; Simas & McClarrey, 1979). The second evaluated the effectiveness of different recruiting methods and strategies (e.g., Decker & Cornelius, 1979; Rynes & Miller, 1983; Sands, 1973). The third explored RJPs and applicant-focused perceptions (Reilly, Tenopyr, & Sperling, 1979; Rynes & Lawler, 1983; Wanous, 1973).

Recruitment research in the 1980s largely continued the research of the 1970s: recruitment interviews (Borman, Eaton, Bryan, & Rosse, 1983; Rynes & Miller, 1983); sourcing strategies (Swaroff, Barclay, & Bass, 1985); and realistic job previews (Premack & Wanous, 1985). However, research began to expand these recruitment strategies in new ways. For example, researchers began to study discrimination in recruiter evaluations (Graves & Powell, 1988) and examine different approaches to recruitment, such as internships for college students (Taylor, 1988). Perhaps the most significant new area of research was the inclusion of utility analysis into recruitment (Boudreau & Rynes, 1985). While it had been recognized that effective recruitment strategies could enhance the financial benefits of staffing systems (primarily by influencing the selection ratio; Sands, 1973), the article by Boudreau and Rynes (1985) was the first to assess the utility of recruitment.

The 1990s saw the Internet become a radical disruptive technology, and a strong economy created intense competition for highly skilled talent. Recruitment research published during this time reflected these trends and became increasingly specialized and sophisticated. For example, Martin and Raju (1992) expanded utility analysis research to include the more specific consequences of various cut scores on recruitment costs. Barber and Roehling (1993) used verbal protocol analysis methods from cognitive psychology to understand applicant decision processes. Barber, Hollenbeck, Tower, and Phillips (1994) manipulated different interview formats (e.g., recruitment, selection) and tracked the consequences on applicant information acquisition over time.
Current Recruitment Research in JAP

The research described in the previous section set the tone for current recruitment research at JAP. Although this research continues to explore the effects of different recruiting strategies on applicants’ behavior pre- and posthire, the dramatic changes in business and society are pushing recruitment research to evolve in new ways.

Recruitment and diversity. Many firms have diversity hiring goals as part of their mission, so it is not surprising that research is focusing on how recruitment can enhance workforce diversity. Much of this work has attempted to identify the recruiting tactics and media that increase the attraction of diverse candidates (Avery, 2003; Walker, Feild, Bernerth, & Becton, 2012; Walker, Feild, Giles, Armenakis, & Bernerth, 2009). Other research has linked recruitment to diversity and selection. For example, Newman and Lyon (2009) found that targeting a diverse and qualified workforce will reduce adverse impact in subsequent hiring decisions. Together, these studies show that the effects of diversity in recruitment messages are moderate to small and conditional on the medium, but even small effects may be useful for increasing the diversity of the applicant pool and reducing adverse impact. However, recruiting large numbers of minority candidates who are not qualified or less qualified than majority candidates will only exacerbate adverse impact. Because a diverse workforce is a goal for most organizations, the need for more research on this topic is apparent.

Recruitment practices and technology. One consistent program of recruitment research leading into the 1990s focused on the effectiveness of different recruitment practices. This research matured to the point where it became possible to use meta-analysis to summarize the primary studies and identify the relative impact of different practices on recruitment outcomes. For example, Chapman, Uggerslev, Carroll, Piasek, and Jones (2005) conducted a large-scale meta-analysis on the determinants of applicants’ perceptions of organizational attractiveness and job choice. They found that fit, hiring expectations, characteristics of the job and firm, and recruiter behavior were the key determinants. They then extended these findings to test different theoretically derived path models.

Just as the study of some recruiting practices matured, technology radically changed traditional recruiting practices and made several of them obsolete. First the Internet, and now social media and other sources of “Big Data,” have revolutionized the nature of recruitment. Nearly all firms use the Internet for recruitment (e.g., career pages), and many use some form of social media (Mulvey, 2013), although it is arguable whether social media enhances recruiting effectiveness. Research on recruitment practices is therefore now primarily focused on Internet recruiting. Most of this research manipulates different Internet/website features to examine the effects on such outcomes as perceptions of organizational attraction and application decisions (e.g., Allen, Mahto, & Otondo, 2007; Dineen, Ash, & Rowe, 2002; Dineen & Noe, 2009; Dineen, Ling, Ash, & DelVecchio, 2007). It is interesting to observe that most of this research has been published nearly a decade after Internet recruiting became popular in industry, suggesting about a 10-year lag between practice and research.

Recruitment and organizational image. A relatively new area of recruitment research focuses on how applicants view the organization in terms of its employment brand, reputation, or image.3 Organizational image is important not only because it affects applicant attraction and job choice, but also because it may be used to differentiate strategically the firm from its competitors. For example, research suggests that recruitment practices (particularly word-of-mouth) influence applicants’ brand equity perceptions, while awareness of the organization’s products can influence the recruitment process and consequences of recruitment practices (e.g., Collins, 2007; Collins & Stevens, 2002). Other studies have focused on the roles of different channels used to communicate information about the job or company on perceptions of organizational image and applicant outcomes (Allen et al., 2007; Cable & Yu, 2006). Applicants’ organizational image perceptions appear to be highly stable across judges (Highhouse, Broadfoot, Yugo, & Devendorf, 2009) and can therefore have important consequences on recruitment outcomes. More research is needed to understand the connections between marketing, recruitment, and organizational image.

Theories of recruitment. One of the most profound changes beginning in the 1980s and carrying through to current times is a movement toward more theoretically rigorous recruitment research. Research conducted prior to (approximately) the 1980s had more of a “practice-driven” focus, while subsequent research has shifted to more of a “theory-driven” focus. Although there is not currently a widely accepted “theory of recruitment,” research in this area has benefitted from blending theory from related literatures. One theoretical approach adapts theories from cognitive psychology and social cognition that explain information processing, attitude formation, and persuasion (Breauh, 2013). For example, social psychological theories have been employed to understand internships (Zhao & Liden, 2011), recruiting visits (Slaughter, Cable, & Turban, 2014), and recruiting sources (Van Huy & Lievens, 2009). An alternative theoretical program focuses on PE-fit and has applied it to the understanding of websites (Dineen et al., 2002; Dineen & Noe, 2009), stages of recruitment (Swider, Zimmerman, & Barrick, 2014), and national culture (Turban, Lau, Ngo, Chow, & Si, 2001). Other theoretical approaches include brand equity theory (Collins & Stevens, 2002) and media richness theory (Cable & Yu, 2006).

While these various approaches are helpful in understanding specific aspects of recruiting processes, they may come at the cost of capturing the breadth of recruiting practices. One must question whether such “micro-theories” of specific components within the entire recruiting process inhibit a search for a holistic recruiting framework that is more broadly useful to practitioners (cf., Breauh, 2013). The comprehensive framework presented by Chapman et al. (2005) offers an important start toward developing a general model applicable for practice.

Research and Practice Issues in Recruitment

The business, economic, and societal forces of modern times are radically different from those in prior decades. Globalization, Internet and mobile technologies, demographic shifts, economic uncertainty, and the speed at which change occurs create a number of practice challenges in recruitment. Organizations now must find

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3 Although there are distinctions among these constructs, these distinctions are not critical for present purposes so we consider them jointly.
effective recruiting strategies that reach a diverse group of people who live in many parts of the world, have different career expectations, and have different levels and kinds of access to electronic technology. However, the focus of current research may not always be in alignment with the immediate needs of practitioners. As noted, there is an increasing emphasis on theoretical understanding rather than descriptions of recruitment practices (that was more typical in JAP prior to the 1980s). As a consequence, this research is less likely to have immediate practical applications even when it has interesting theoretical implications or potential future guidance for practice. The practice of recruitment is also changing rapidly because of technology and economic shifts affecting the location of work and the mobility of the applicant pools for many occupations. Implementation of attracting and sourcing strategies is often proceeding more by trial and error than by systematic, evidence-based efforts. Yet because of the rapid changes in recruitment practices, research is often focused on out-of-date practices. For example, the use of want-ads, employment agencies, and company employment offices to facilitate recruiting have been largely discontinued and replaced with job boards, recruiting websites on company webpages, and applicant tracking systems that manage the application and selection processes. Instead of recruiting efforts being determined by the results of research, they are increasingly driven by the appeal of the newest technologies. With these challenges as background, we identify some of the major practice issues in recruitment that would benefit from greater practitioner-academic research collaborations.

First, in many situations, different sources of applicants need to be identified. Even though the Great Recession has been over for several years, employment rates remain quite variable across jobs, industry sectors, and countries. While labor shortages exist for some occupations in some places, the true magnitude of such talent shortages is often unclear. Whether shortages are because of a lack of qualified candidates, unrealistically high hiring expectations by employers, or a combination of the two is not apparent (Cappelli, 2012). What is clear is that firms must increasingly focus on identifying—or sometimes even creating—pools of the necessary talent earlier in the recruitment process or in locations different from their typical recruiting sources. For example, global recruitment is becoming more important because candidates with the necessary qualifications are not evenly represented in different countries (Ryan & Delany, 2010). Developed countries tend to have a larger percentage of older workers in the workforce than developing countries, but developing countries have fewer people with advanced skills. As a consequence, employers are forced to recruit in places where there are more plentiful applicants. Alternatively, organizations may develop an applicant pool when a qualified pool of candidates to source and attract does not exist (e.g., organizations investing in high school and college programs). Organizations, particularly those in developed countries, may also consider nontraditional applicants or atypical work schedules for hard-to-fill jobs. For example, applicants beyond the “normal” age of retirement may offer well-honed skills on a part-time basis. In addition, organizations may need to turn to passive candidates (i.e., those who are not actively engaged in a job search) to find those who meet the requirements of the firm’s jobs. Along with this effort to identify the passive candidates, firms may also need to emphasize their competitive advantages to attract such applicants. In summary, future collaborative research should focus not only on effective recruiting strategies but also on efforts to identify where those strategies will be most productive, and for whom.

Second, organizations often fail to keep data that allow them to assess the adequacy of their sourcing and attraction methods, rendering evidence-based decisions difficult if not impossible. Because of technology, multiple sources of job information exist, and they continually evolve, making it is difficult to isolate the sources that influenced a candidate. Therefore, future research will need to be based on complete and accurate data about recruiting activities as well as consider more broadly the sources of information available to candidates and determine which are meaningful to them.

Third, much of the recruiting research focuses on the effectiveness of a particular platform or website rather than an examination of the characteristics that promote its usefulness for applicants or detract from it. In the future, researchers will need to move from studying specific technological platforms (e.g., Facebook) toward frameworks that capture the key features of the platforms (McFarland & Ployhart, 2015). Fourth, technology and organizations’ need for speed and flexibility in staffing have created a very dynamic recruitment process for many firms that is not reflected in the extant research on the components of recruiting and is not as linear as it was in the past. Research in the future that adopts designs that do not assume a set, linear recruitment process is likely to produce a more realistic model and provide more actionable conclusions for practitioners.

Finally, as the academic field has become more specialized, the concerns of the practitioner world have become more integrated. For example, recruitment and turnover are inextricably connected in practice but not in most research (for an exception see Weller, Holtom, Mathiase, & Mellewigt, 2009). The answers to questions of whom to recruit and when to recruit are highly affected by turnover. Recruitment research needs to consider recruitment and turnover jointly; they are different sides of the same talent equation.

Selection Research in JAP

Selection involves identifying the critical KSAOs needed for effective performance on critical aspects of the job, creating accurate ways of measuring individuals on these KSAOs, and then using the scores on these assessments to make hiring decisions (Schmitt & Chan, 1998). The ultimate goal is to enhance not only job performance, but also organizational performance and competitive advantage. This is the essence of the Supreme Problem introduced by Hall (1917), the “predictive hypothesis” noted by Guion (1965), and the “performance prediction problem” discussed by Campbell (1990). Job analysis is used to identify the critical tasks of a job and the critical KSAOs needed to perform those tasks (Schmitt & Chan, 1998). Once measures of the necessary KSAOs are identified or developed, appropriate forms of validity evidence should be accumulated. Yet beyond predictive validity, a selection system should also try to minimize or eliminate adverse impact, be seen as acceptable to applicants, be consistent with the firm’s employment brand, and be efficient and cost-effective in delivering reasonable return on investment. Selection research published at JAP has emphasized these topics to varying degrees over the last 100 years.
Early Selection Research in JAP

As noted previously and in supplemental Appendix A, the nature of the *Supreme Problem* in the early years of *JAP* was largely one of addressing selection challenges created by World War I and the abundance of skilled labor that resulted from that conflict. As a result, most of the articles in the first couple of decades (1917 to about 1940) of *JAP* dealt with the validation of ability tests for selection into different occupations in various contexts. By today’s standards, these were simplistic studies based on sample sizes almost always fewer than 100, using only bivariate correlations or charts to display the relationship between test scores and performance data, which were usually supervisor ratings. However, these studies were attempting to address important practical problems. Increased sophistication of the predictor and criterion measures used in these studies, and expansion of the topics related to selection and validation covered, began to appear almost immediately. For example, Thordike (1920) noted the presence of a constant error in ratings used as criteria in selection research, and Remmers (1934) identified halo error in students’ appraisals of their teachers. The potential of personality tests was addressed by Brandenburg (1925), and the value of the interview as a research and teaching device was discussed by Hartmann (1933). Developments in data analyses were also published in these early decades. Kelley (1934) described the impact of range restriction on reliability, a problem still being addressed in our literature (e.g., Hunter, Schmidt, & Le, 2006). Multiple correlation and regression were described in a book by Edgerton (1931), which was reviewed in *JAP*, but we did not locate any articles using these methods of data analysis until several years later (e.g., Huttermeier & Brown, 1936; Moore, 1941). However, authors of these early studies using multiple regression did not seem to recognize the problem of shrinkage of the multiple correlation when it was estimated using a large number of predictors in a relatively small sample and the importance of cross-validation.

Soon additional modes of testing were reported, including biodata (Scott, 1938), situational tests (Karn, 1949), group exercises (Bass & Norton, 1951), leadership measures (Fleishman, 1953), assessment centers (Bray & Campbell, 1968), and personality inventories (Ghiselli & Barthol, 1953). The latter article represents what is probably the first meta-analysis of selection test validities, though modern corrections for the magnitude of observed relationships were not employed.

The criterion domain also expanded during this period of time to include measures of turnover (e.g., Kitson, 1933; Kerr, 1947), accidents (Brown & Ghiselli, 1948), and team performance (Wiest, Porter, & Ghiselli, 1961), as well as new measurement tools, such as behaviorally anchored rating scales (Smith & Kendall, 1963). Concerns with the criterion, in general, were also expressed (Gaier, 1952; Dunnette, 1963a). Toward the end of this time period, the use of the multitrait multimethod approach to the study of construct validity was introduced to *JAP* readers (Locke, Smith, Kendall, Hulin, & Miller, 1964). Wernimont and Campbell (1968) espoused a greater attention, and fidelity, to the criterion in constructing and selecting predictor measures.

Current Selection Research in JAP

Current concerns about the use of tests. The utility of selection procedures, which occupied a number of *JAP* pages in the 1980s and 1990s, was introduced by Taylor and Russell (1939), and concerns about mediators and moderators (e.g., Ghiselli, 1963; Dunnette, 1963b) resulted in a much more complicated model of the relationships between personal characteristics and performance outcomes than was prevalent in the first several decades of the Journal. The complexities of individual difference-outcome relationships remain an important concern of *JAP* authors (e.g., Aguinis, Beaty, Boik, & Pierce, 2005; Le et al., 2011).

Because of the Civil Rights movement and related legislation and court cases in the 1960s, researchers reported more comparisons of the test performance of members of different demographic groups (e.g., Bartlett & O’Leary, 1969; Kirkpatrick, Ewen, Bartlett, & Kattell, 1968). The Civil Rights Act of 1964 produced an explosion of research exploring appropriate methods of comparing data from subgroups of examinees and evaluating the attributions about the relationships between predictors and criteria by group. The courts continue to interpret the nature and meaning of employment discrimination in selection, and thus this stream of research continues into the 21st century. Boehm’s (1972) article represents an early attempt to aggregate studies reporting little evidence of differences in validity coefficients though there were large differences in group averages on some measures. These findings were further supported by Schmidt, Berner, and Hunter (1973), who argued that findings of differences in validity for majority and minority groups were a function of the differences in sample sizes and the fact that previous researchers had incorrectly considered tests of the significance of the validity in each group separately rather than conducting tests of differences in the validities across groups. The accepted conclusion of this research, and a broadened differential prediction formulation that considered both intercept and slope differences in regression, was that there was no evidence for demographic slope differences but that differences in intercepts usually indicated some overprediction of the performance of lower scoring (on the predictor) minority groups.

Prior to reaching this “consensus,” there was an active debate regarding the appropriate definition of prediction bias that was summarized by Hunter, Schmidt, and Rauschenberger (1977). The definition of test bias (Cleary, 1968) that was finally accepted depended on a bias-free criterion, which also received attention in the literature (Hattrup, Rock, & Scal, 1997; Kraiger & Ford, 1985). This accepted wisdom (i.e., that minority group performance is slightly overpredicted by selection tests) has been challenged recently by Aguinis, Culpepper, and Pierce (2010). Mattern and Patterson (2013), using a large database of educational data, showed that there was a slight overprediction of Black and Hispanic student performance and an underprediction of female performance. Their analyses employed corrections of validity data for statistical artifacts, the absence of which was one of the Aguinis et al. criticisms of previous differential prediction research. Berry, Clark, and McClure (2011) have presented data that indicate some group validity differences in the employment setting that dispel the notion that differential validity of tests does not exist. However, Berry and Zhao (2015) corrected for a biased intercept test and used operational validities (corrected for artifacts) and found overprediction of African American performance, using meta-analytic
estimates of key relationships. This issue is likely to continue to be an active area of research.

**Current conceptual and measurement developments in the criterion.** Perhaps because of the articles cited above on the nature of the criterion, and because of dramatic changes in the nature and structure of work (see supplemental Appendix A for more detail), the last several decades of the Journal have been marked by an increased attention on the nature of the work performance construct and the development and use of outcome measures other than overall task performance. Rosenbaum (1976) described efforts to predict employee theft that seem like a precursor of more recent attention to counterproductive work behavior (Bennett & Robinson, 2000). Parsing the nature of turnover into functional and dysfunctional aspects as well as its voluntary or involuntary nature (Dalton, Krackhardt, & Porter, 1981) allowed advances in our understanding directed relative to early concerns with labor turnover. Looking at the positive aspects of work behavior, Smith, Organ, and Near (1983) introduced the notion that organizational citizenship behavior was an important worker outcome that likely was not included in traditional ratings of overall or task performance. Pulakos, Arad, Donovan, and Plamondon (2000) made the case that employee adaptability to changing work demands was an important aspect of employee performance. Sackett, Zedeck, and Fogli (1988) provided an important distinction between typical and maximal performance. Finally, a leading influence in these attempts to consider multiple criterion dimensions was the Project A work directed relative to social validity (Von Rosenstiel & Woschee, 2011).

**Current developments in the nature and measurement of predictors.** The expansion of the predictor constructs considered as well as the methods used to measure them has continued to be a topic in many of the selection articles appearing in the Journal. A relatively early delineation of what might be aspects of both the predictor and criterion domains was the comprehensive taxonomy of worker behavior provided by Fleishman (1967). New methods of measuring individual differences included the accomplishment record (Hough, 1984) and the situational judgment test (Motowidlo, Dunnette, & Carter, 1990). Ryan and Sackett (1989) brought research attention to the use of individual assessments (recently meta-analyzed by Morris, Daisley, Wheeler, & Boyer, 2015, and Van Iddekinge, Putka, and Campbell (2011) may have resurrected interest in the potential use of vocational interest inventories as selection devices. Arthur, Bell, Villado, and Doverspike (2006) have provided meta-analysis of person-fit measures.

Of all the various selection devices, however, personality measures have probably received the most attention in the last 25 years, particularly after Digman (1990) introduced the Big Five and Barrick and Mount (1991) published their meta-analysis of the validity of measures of these constructs. Instead of examining self-reports of Big Five measures, Oh, Wang, and Mount (2011) examined the meta-analytic validity of observer ratings of personality. They found that observer ratings had higher validity (range from .18 to .32 corrected) than did self-ratings (range from .05 to .22). Moreover, the observer ratings displayed incremental validity over self-ratings though the reverse was not true. Lievens and DeSoete (2011) describe a number of innovative selection techniques that show promise as measures of personality constructs including a variety of serious games that may help organizations improve their image, attractiveness, and, in some instances, the validity of their selection measures. The search and evaluation of new sources of information on personality measures will and should continue.

Concerns about faking personality measures have appeared frequently (e.g., Hogan, Barrett, & Hogan, 2007; Schmitt & Oswald, 2006; Zickar & Robie, 1999), as well as concerns about their use in other cultures (e.g., Ghorpade, Hattrup, & Lackwitz, 1999). There have also been articles that examine potential curvilinear relationships between personality measures and performance outcomes (Le et al., 2011) and the role of mediators in personality–performance relationships (e.g., Barrick, Stewart, & Piotrowski, 2002). In addition, Drasgow and his colleagues (e.g., Tay, Drasgow, Rounds, & Williams, 2009) have presented evidence that ideal point models might be better representations of responses to personality items than dominance models. The ideal point response models posit that some items cannot be endorsed by people who are both more and less extreme in their response to an item.

**Test reactions.** Beginning perhaps with the publication of an article by Keenan and Kerr (1952) on the fairness of tests as seen by employment counselors, researchers and users have been concerned with the perceptions of selection tests by examinees and others. Gilliland’s presentation of selection system fairness from an organizational justice perspective (Gilliland, 1993) and his test of some justice predictions (Gilliland, 1994) have generated many dozens of subsequent research articles both in this country and beyond (Steiner & Gilliland, 1996) where these concerns are often referred to as social validity (Von Rosenstiel & Woschee, 2011). Most of this research has related these reactions to selection procedures to examinee perceptions of the organization and its people rather than to more objective outcomes such as acceptance of jobs or subsequent performance. An exception is the recent article by McCarthy et al. (2013), who found that reactions indirectly influenced job performance through the applicants’ test scores. These reactions did not impact the criterion-related validity of the tests.

**Concerns about establishing appropriate evidence of validity.** A primary concern of selection researchers is validity, the nature of the evidence one uses to support the attributions about employee performance made based on test scores. Early selection research relied almost solely on criterion-related validity, the correlation between test scores and scores on performance outcomes of interest. This basic design of a validity study has been elaborated and the efficacy of other approaches has frequently been explored by JAP authors. The meaning of validity has been discussed in the editions of the Standards for Educational and Psychological Testing, most recently in 2014. The various manners in which studies of criterion-related validity have been conducted were described and evaluated by Sussman and Robertson (1986). Binning and Barrett (1989) provided a model integrating ideas about various types of validity evidence that has been frequently adapted and discussed. This model will certainly need to be expanded and modified as selection researchers begin to consider multilevel and cross-level relationships. Questions about what constitutes construct or content validity have been raised in JAP (e.g., Murphy, Dziewczynski, & Zhang, 2009). The use of latent variable models and corrections for unreliability of measurement represent a long term concern that individual difference measures give us insight into an underlying construct, although this research seems to have hit its zenith between 1985 and 1995.
Research and Practice Issues in Selection

Currently, there are tremendous changes taking place in business (e.g., globalization), society (e.g., demographic shifts, migration, values, and expectations regarding work), and technology (e.g., mobile devices) (see Appendix A for more details). These changes occur rapidly and often affect operational testing programs. Yet, research in selection frequently lags behind these significant shifts, and practitioners have needs that are often unmet by the research literature. First, we continue to search for and need tests or item types that minimize subgroup differences while maintaining high validity and cost-effectiveness. Research on this topic seems to have waned in recent years, perhaps because none of the “easy” approaches have been effective and because the potential causes of subgroup differences occur outside of employment contexts (e.g., Cottrell, Newman, & Roisman, 2015). Emerging research on innovative methods of evaluating individual capabilities that take advantage of modern technology may identify new measures that have widespread practical utility and serve to maintain validity while reducing subgroup differences. Second, effective strategies for reducing cheating and faking and improving the reliability of various measures, particularly personality tests and other self-rating item formats, remain at the forefront of practitioners’ concerns. Third, it is perhaps more important than ever to engage applicants in the testing process by providing instruments that appear relevant to the target job(s) and reinforce the organization’s brand. There needs to be a recognition that selection processes have functions other than evaluating the applicant’s KSAOs, such as conveying information about the job and the type of organization to which one is applying and attracting the applicant to the organization. Although some of this research has been conducted within the area of applicant reactions and attraction (e.g., Bauer, Maertz, Dolen, & Campion, 1998; Chapman et al., 2005), we are calling for research on a broader set of selection-related outcomes and answers to questions such as: “How might selection practices shape perceptions of the organization’s culture (as opposed to attractiveness)? Do firms that use more “innovative” selection practices attract or recruit higher-quality candidates?” Fourth, new techniques for overcoming common problems related to validating test scores in operational settings are needed. Employers often need to establish the validity of their selection procedures but lack the sample size to utilize traditional validation designs and find no alternative validation strategies that provide sufficient evidence to justify the use of a test. They also recognize the deficiencies of criteria that are based on supervisory ratings and their effect on validity; however, for many jobs there are no practical alternatives. Finally, despite the fact that many firms now hire within a global context, research on global and international selection issues remains largely absent.

One obvious illustration of the gap between selection research and practice concerns the nature of what is published. It has become rare that primary validation studies are published in JAP, as was typical for the first two thirds of the Journal’s history (the often-cited reason is that such studies do not make a significant theoretical contribution). Primary validation studies are still published, but they tend to be published in journals with a more narrow focus specifically on selection. We now seem to rely on large-scale meta-analytic research that is dependent on these primary studies to establish the existence, magnitude, and generalizability of predictor-criterion relationships. However, these meta-analyses do already and will increasingly include large numbers of unpublished studies. How we determine the quality of these primary studies and when to include them in our meta-analytic work remain troubling issues (see the series of articles on integrity tests headed by Van Iddekinge, Roth, Raymark, & Odle-Dusseau, 2012). In addition, the “file drawer” problem persists, and the representativeness of the studies included in a meta-analysis usually remains unknown though methods of assessing its likely impact on meta-analytic estimates are available (Rothstein, Sutton, & Borenstein, 2005).

The concern about meta-analytic source data also hints at the need to consider the role of Big Data that is transforming research in most areas of science. In our field, Big Data will likely produce the same opportunities and problems as have been true in other areas of scientific endeavor (e.g., Reichmann, Jones, & Schildbauer, 2011). One could foresee large multiorganizational, multicountry data banks that could be used to assess the validity and utility of selection tests in a variety of contexts. One can also envision Big Data enabling the use of nontraditional predictors (e.g., information from social media, credit scores) and the accompanying rise of practical questions regarding the job relevancy of the predictors and personal privacy. Many organizations will seek to use Big Data for selection decisions, regardless of whether such processes meet the rigor expected by applied psychologists and required by the U.S. legal system. Therefore, it is vital that selection researchers consider the potential benefits and risks of such approaches in their research.

Unproctored Internet testing, in which an examinee takes a test in some convenient location without supervision, has become increasingly popular in the last decade or so and has now become the only method by which some organizations assess large portions of their applicant pool and the primary method of delivery of exams by test publishers and consulting firms (Tippins et al., 2006). This mode of test delivery is convenient for both employer and applicant, standardizes test administration and scoring procedures, offers substantial reductions in test administration costs, and provides results quickly. However, it produces significant concerns about cheating, test security, and standardization of the testing environment. Perhaps the most commonly recommended approach to alleviate some of the concerns about these applications is to use unproctored test scores as a screen and verify the scores with a proctored exam administered to a smaller set of examinees who met some standard on the unproctored test (e.g., Lievens & Burke, 2011; Weiner & Morrison, 2009). More sophisticated approaches use a computer adaptive test as an initial screen and follow that with a verification test that is also a computer adaptive test administered in a proctored setting. The score on the initial test can be used as a prior “ability” estimate in beginning the second proctored exam, thus shortening the testing process considerably and allowing for a quick determination of the possibility that a person cheated in some way on the unproctored exam.

Finally, selection research grew out of an interest in individual differences so it is natural that our primary focus has been on the nature of relationships among variables measured at the level of the individual. But businesses succeed or fail based on their ability to create performance advantages relative to their competitors. Even though such business-unit outcomes were expressed as relevant and important in the early days of JAP (e.g., Hall et al., 1917,
drew a connection between “human capacities” and “national resources”), and there was at one time an active literature on utility analysis; it is only within the past decade that researchers have directly examined the impact of selection across multiple levels (i.e., individual and organizational levels). Multilevel issues and applications were introduced to the selection community by Klein and Kozlowski (2000), with an important implication for selection: Validity observed at the individual level may not generalize to the firm level. Indeed, studies of small groups and teams have found that relationships between individual KSAOs and individual performance frequently differ from a group’s KSAO composition and group performance (e.g., Barrick, Stewart, Neubert, & Mount, 1998; Bell, 2007; LePine, Hollenbeck, Ilgen, & Hedlund, 1997; Neuman & Wright, 1999). Such differences are most profound when trying to staff teams with distributed expertise (e.g., cross-functional teams; Mathieu, Tannenbaum, Donsbach, & Alliger, 2014).

Most of the early work on multilevel selection was theoretical (e.g., Ployhart, 2004, 2012; Ployhart & Moliterno, 2011). Recent empirical research finds both similarities and differences from individual level findings. Ployhart, Van Iddekinge, and MacKenzie (2011) provide evidence that generic human capital in the form of personality and cognitive ability leads to changes in unit-specific human capital such as training and experience which in turn leads to unit service performance and business outcomes, Van Iddekinge et al. (2009) showed that the implementation of selection and training programs was related to customer service which in turn was related to restaurant profits. Kim and Ployhart (2014) found that firms that were more selective in their hiring outperformed competitors before, and especially after, the Great Recession. Whether or not validity based on group-level criteria is an acceptable replacement in practice for validity that is based on individual-level data is unknown, but demonstrating the business-level consequences of individual differences, selection, and recruitment is helpful for showing that they offer strategic value and thus elevates their importance to organizational leaders.

**Summary**

One hundred years of research in the areas of selection and recruitment have answered some questions, left some unanswered, and raised many new questions. The “answers” that exist are rarely definitive and apply to all conditions; rather, the context in which the research was conducted matters a great deal, with a few notable exceptions (e.g., the power of cognitive ability measures to predict job performance across many different occupations and levels). It would be impossible to list all of the conclusions to be drawn from the literature.

First, both selection and recruitment research have tended to address real-world problems. For most of the 20th and 21st centuries, organizations have had an obvious need to find capable employees to maintain their competitiveness. The gap between practitioners’ concerns and researchers’ interests is narrower in recruiting and selection than many other fields within industrial and organizational psychology; however, a gap still exists, particularly in the area of recruiting where researchers strive to create and substantiate meaningful theories that often have questionable usefulness for practice or to delve into the efficacy of recruiting practices that are out-of-date by the time the research is published. The extent of the gap may be narrower with respect to selection research, where much effort is focused on refining predictors and criteria, developing methods to assess the strength of their relationships, and examining the differences in those relationships for members of protected groups. Most of this research is applicable to the work of the practitioner. For selection research, the gap that does exist often manifests itself in what is not addressed in the research. For example, we have not reached professional consensus on how best to assemble evidence of validity when the sample size is very small.

Second, two topics in the selection and recruitment literature appear to be overriding concerns: individual capability and diversity. Most of the selection and recruiting research in JAP answers one of three questions: How do I accurately determine who has the KSAOs to perform a particular job? Where do I find them? How do I identify people of diverse backgrounds? To date, the impetus for much of the research on capability and diversity has originated with the legal and social environment in the United States; however, in more recent years, the global business environment has highlighted the need to identify a capable workforce with the prerequisite KSAOs regardless of their race, creed, color, ethnicity, sex, and so forth, as a means of maintaining a competitive advantage.

Third, both selection and recruitment can be seen from two points of view: that of the individual candidate and that of the organization. The early research in JAP focused on how the company could find people who possessed the right skill set. Later research in the form of applicant reactions has explored candidates’ responses to different recruiting and selection strategies. Although research may address problems from either point of view, most researchers and especially practitioners today recognize the importance of both.

Fourth, technology is playing an increasingly important role in recruitment and selection as well as other business processes. A great deal of research from the last 20–30 years looks at ways to harness the power of technology to improve recruiting and selection processes in terms of speed and flexibility, and to solve the problems it creates (e.g., unproctored Internet testing and the problem of cheating).

**The Supreme Problem, Version 2.0**

One century ago, Hall (1917) referred to the challenge of recruitment and selection as the “Supreme Problem.” As we look toward the next century of research on recruitment and selection, it seems inconceivable that this Problem will be any less Supreme. Human talent is increasingly the engine and differentiator behind organizational competitive advantage, which is leading to greater recognition that selection and recruitment are strategically valuable. The enormous changes in politics, societal attitudes, and the legal system have fundamentally defined the nature of selection, but also created important boundaries that firms still struggle with today. So long as there are organizations and jobs, there will be a need to find people who best fit them.

Yet, in that same first issue of JAP one century ago, Hall et al. (1917, p. 6) also noted: “The problem is so far-reaching that one finds it difficult to determine whether the burden of its significance attaches to its psychological, its economic, or its social aspects.”
We envision the science and practice of recruitment and selection to change in ways to meet the psychological, economic, and social challenges of the future although the precise nature of the changes is difficult to anticipate.

In terms of psychological challenges, the needs of applicants will become more important as the availability of labor in occupational areas that are important to the hiring organization diminishes. The technological revolution will continue to affect recruiting and selection methodologies in ways that engage applicants and meet the needs of highly qualified candidates, even as concepts such as validity and reliability remain central requirements. In addition, those who work in organizations, including those who work in recruitment or selection, have their own needs and expectations of the processes, especially as they relate to technology. Although the speed of recruitment and selection processes, the accuracy of the selection tools, and the effectiveness of the recruiting process have been important considerations of practitioners for some time, they are likely to receive increased emphasis in light of the demands of business in the 21st century and the opportunities technology-enhanced tools can provide.

Economically, organizations will likely operate under conditions that the U.S. military calls VUCA: volatile, uncertain, complex, and ambiguous. To remain competitive in a VUCA environment, firms will increasingly rely on their human capital resources and their ability to reconfigure and redeploy those resources for different strategic purposes. Using teams as the basic organizing structure for work is one way to create such flexibility. However, we still have much to learn about how to best recruit and select for effective team functioning and performance. Pursuing this work in a systematic fashion is difficult because the team task and temporal processes have a strong influence on team KSAO composition–team performance outcomes. Moving from the team to the organizational level introduces even more contextual influences, such as economic and industry effects. Yet within such contextual influences, recruitment and selection are central to the successful deployment of human capital resources, and will perhaps finally be recognized as the strategically vital capabilities that they are. Drawing the theoretical and empirical connections between recruitment and selection to team and organizational performance is just starting to occur, and our hope is that it will continue.

Socially, changing attitudes, values, and employment regulations, both within and across countries, will almost certainly ensure recruitment and selection practices will continue to evolve over time. By extension, research must adapt to changing social expectations and comply with the relevant laws and regulations related to recruitment and selection. It is difficult to predict how these laws and regulations may change as the demographic composition of many countries becomes increasingly diverse and the political environments shift, but it is likely that changes in who is protected and how they are protected will occur. If the future is anything like the past, myriad social changes that affect recruitment and selection will also occur. For example, job mobility may well continue to increase as younger generations place higher values on learning and leave an employer in the absence of opportunities to learn. Alternatively, workers are discovering the wide reach of the Internet and the unintended consequences of postings. We might also hypothesize that the value workers place on work-life balance will continue to grow and substantially change what aspects of a job are attractive to them.

The Supreme Problem has remained constant for 100 years, but our definitions, frameworks, and methods for understanding the problem have developed considerably over that time. Enormous progress has been made, and personnel selection is one of the successes of applied psychology. We suspect the Problem will reign Supreme for the next 100 years; yet how we address it will evolve in ways driven by changing psychological, economic, and societal forces. Supplemental Appendix C provides our speculation into the future of recruitment and selection research, organized according to the psychological, economic, and social aspects proposed by Hall et al. (1917). So long as academics and practitioners continue to collaborate and the field maintains a scientist–practitioner model, the methods for effective recruiting and selection will continue to develop. Readers will need to wait for the 2117 issue of JAP to determine the accuracy of these speculations.

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