One Hundred Years of Work Design Research: Looking Back and Looking Forward

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In this article we take a big picture perspective on work design research. In the first section of the paper we identify influential work design articles and use scientific mapping to identify distinct clusters of research. Pulling this material together, we identify five key work design perspectives that map onto distinct historical developments: (a) sociotechnical systems and autonomous work groups, (b) job characteristics model, (c) job demands-control model, (d) job demands-resources model, and (e) role theory. The grounding of these perspectives in the past is understandable, but we suggest that some of the distinction between clusters is convenient rather than substantive. Thus we also identify contemporary integrative perspectives on work design that build connections across the clusters and we argue that there is scope for further integration. In the second section of the paper, we review the role of *Journal of Applied Psychology* (JAP) in shaping work design research. We conclude that JAP has played a vital role in the advancement of this topic over the last 100 years. Nevertheless, we suspect that to continue to play a leading role in advancing the science and practice of work design, the journal might need to publish research that is broader, more contextualized, and team-oriented. In the third section, we address the impact of work design research on: applied psychology and management, disciplines beyond our own, management thinking, work practice, and national policy agendas. Finally, we draw together observations from our analysis and identify key future directions for the field.

Keywords: job characteristics, job demands, job design, job resources, scientific mapping

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"Is there no inspiration in labor? Must the man who works go on forever in a deadly routine, fall into the habit of mechanical nothingness, and reap the reward of only so much drudgery and so much pay? I think not. The times demand an industrial prophet who will lift industry off from its rusted, medieval hinges and put pure human interest, and simple, free-spirited life into modern workmanship" (**McChesney, 1917**, pp. 176–177).

In the *Journal of Applied Psychology's* (JAP) first edition, G. G. McChesney made this elegant call to more seriously design work that preserves human character. McChesney went on to argue that "every man should be more of a man, a better man, for having worked a day," and that "deterioration of men deteriorates profits" (p. 177). Thus, right from its very beginning, JAP considered what type of work is best for organizations and those who work in them.

McChesney's reflections, and related interest in the question of what makes good work, largely arose because of the specialized and simplified jobs that became prevalent during the Industrial Revolution, when machine-operated work in large factories replaced small, craft-based industries. Smith (1776) formulated the concept of division of labor, an idea that Taylor (1911) took further with the concept of scientific management, in which tasks were broken down into simplified elements. Time and motion study (Gilbreth, 1911) complemented these simplification principles, with Henry Ford fully exploiting them by opening the first continuously moving automotive production line in 1913. The success of this mode of work organization was so great (e.g., the assembly time for a Model T automobile in this plant was reduced from more than 12 hours to a little more than 90 min), that simplified or narrow and low autonomy jobs became the work design of choice in manufacturing and beyond (Davis, 1966). Simplified work designs still exist, as witnessed at contract manufacturer Foxconn, who have become (in)famous for the large-scale production of such products as the iPhone.

Thinking and theory about how to organize work (although not always practice) has developed considerably since Taylor's day, in part in reaction to the responses that job simplification prompted. Unsurprisingly, workers were often deeply dissatisfied with simplified jobs. As well as turnover, strikes, absenteeism, and other negative consequences for organizations, detrimental effects of job

simplification on employees' mental health and job satisfaction began to be documented (e.g., Fraser, 1947). These studies were influenced by the Hawthorne studies (e.g., Roethlisberger & Dickson, 1939) and occurred at a time when there was a flourishing of thinking on motivation, such as that seen in McGregor's (1960) theory X and Y. Over time, the more specific field of research known as job design, and more recently work design, emerged. Empirical work has since flourished. Indeed, there are now more than 17,000 published articles on the topic of work design.

Our goal in this article is to take stock of this vast corpus of research and to examine the role of JAP in shaping its development. As we elaborate, much evidence shows that work design affects health and economic outcomes for individuals, teams, and organizations. At the same time, radical shifts occurring in today's organizations have profound implications for people and their work. In short, work design matters, and we must keep it front and center in the field of applied psychology. We hope the current article helps with this endeavor.

In the first substantive section of the paper, we map where work design research is at and how it got to be there. In the second section, given the 100th anniversary of this journal, we assess JAP's contribution to the field of work design. We show how, although the number of articles published in JAP on work design remains relatively low, the journal has published many of the key articles in the field (throughout, articles published in JAP are noted with bold font). But we also note how the wider field of work design research has benefited from additional perspectives that emphasize work organization for system and team effectiveness and that reflect contemporary changes in the workplace. Work design has been (and should be) a topic that is tightly linked to application. Hence in the third section of the paper, we comment on the extent to which work design concepts are influential in shaping management thinking, are adopted in practice, and are considered at the national policy level. We agree with Peter Warr and Toby Wall who observed over 40 years ago that "work will always matter to people . . . they will always love it and hate it . . . society should help people love it more than hate it" (Warr & Wall, 1975, p. 11). Finally, we identify key further directions for the field.

Before we proceed, it is important to define job and work design. A typical definition of a job is "an aggregation of tasks assigned to a worker" (**Wong & Campion, 1991**). From this perspective, job design refers to the content and organization of tasks. However, scholars have recognized that individuals at work not only execute assigned static tasks, but they also engage in emergent, social, and sometimes self-initiated activities; that is, people can enact flexible work roles (Ilgen & Hollenbeck, 1991). The term *work design* has increasingly been used to capture this broader perspective. *Parker (2014)* defined work design as, "the content and organization of one's work tasks, activities, relationships, and responsibilities," and Morgeson and Humphrey (2008, p. 47) defined it as "the study, creation, and modification of the composition, content, structure, and environment within which jobs and roles are enacted." These broader definitions recognize that work design can be in part crafted by the incumbent, and they allow for work design to be considered at the team level. To help the reader navigate the topic of work design, we provide a glossary of key terms (see online supplemental material [Resource 1]).

It is also pertinent to observe that although most research in this field focuses on work design as an independent variable, we include in our analysis studies that consider work design as a moderator, as a mediator, and as an outcome of top-down forces (e.g., technology, leadership) or bottom-up processes initiated by the incumbent (e.g., proactivity, crafting).

Mapping the Field

To make sense of the vast work design literature, we first identified the 35 most important journal articles. Second, we mapped the research using bibliographic techniques. Online supplemental material (Resource 2) explains both of these analyses in greater depth.

To identify the most important work design articles, we focused on 5708 journal articles on the topic of work design within the field of management and psychology identified using a broad set of search terms. We narrowed this list further by including only those articles published before 2010 that had at least 100 citations (Web of Science), and those between 2010 and 2015 identified as 'highly cited' papers. From this list of more than 500 articles, we identified those influential articles that took the field in new directions. In making these judgments, we did not rely on citations alone because of citations' temporal bias (underestimating the impact of both very early articles and more recent articles), their cultural bias, and because citations do not differentiate the type of influence. Regarding the latter, many highly cited work design articles support the field in important ways, such as via measure development or synthesis of studies, but they do not move the field in a new direction. Many highly cited articles also apply work design theory, rather than develop it, such as a meta-analysis of home-work conflict that identifies work design as one of the many antecedents. We settled on 35 articles for which we had good consensus (see Table 1, which shows these articles in chronological order of their appearance in the literature). When these articles are cited in the subsequent text, we use italics to indicate they are one of the especially influential articles and we use bold italics to indicate the influential article is published in JAP.

Second, we conducted a bibliographic analysis on the 5708 work design studies published in the management/psychology fields. We used the well-established technique of scientific mapping (Waltman, van Eck, & Noyons, 2010) to analyze and create visual representations of topics and relationships between topics within a particular field. Relative to meta-analyses that focus on specific topics, scientific maps "have the capability to zoom out further, and empirically capture the relationships between multiple topic areas" (Lee et al., 2014, p. 340). We used a VOS (visualization of similarities) program, which has been demonstrated to provide a better representation of the underlying data set than maps constructed using multidimensional scaling approaches (van Eck et al., 2010). After extracting noun phrases (or terms) that occur in the abstract or title of articles, the program computed the relevance of terms and assessed their co-occurrence with related terms. Association strength measures were then used as input for visual mapping, creating a two-dimensional depiction of term relatedness.

From the scientific mapping analysis, we identified five clusters of work design research (Figure 1; and see online supplemental material [Resource 2], Table A), with each cluster containing

Table 1
Top 35 Influential Work Design Articles and Their Citations in Chronological Order of Their Appearance in the Literature

Article	GS	WoS
1. Trist, E. L., & Bamforth, K. W. (1951). Some social and psychological consequences of the Longwall method. *Human Relations, 4,* 3–38.	2407	
2. Herzberg, F. (1966). One more time: How do you motivate employees? *Harvard Business Review*. [reprinted in 2003, Best of HBR; also published in *New York: The Leader Manager*, 433–448]	753/1120	50/94
3. Rizzo, J. R., House, R. J., & Lirtzman, S. I. (1970). Role conflict and ambiguity in complex organizations. *Administrative Science Quarterly, 15,* 150–163.	3941	1690
4. Hackman, J. R., & Lawler, E. E. (1971). Employee reactions to job characteristics. *Journal of Applied Psychology Monograph*, 55, 259–286.	2753	1010
5. Hackman, J. R., & Oldham, G. R. (1975). Development of the job diagnostic survey. *Journal of Applied Psychology*, 60, 159–170.	5963	1961
6. Cherns, A. (1976). The principles of sociotechnical design. *Human Relations*, 29, 783–792.	854	234
7. Hackman, J. R., Oldham, G. R. (1976). Motivation through the design of work: test of a theory. *Organizational Behavior and Human Performance, 16*, 250–279.	6006	1809
8. Cummings, T. G. (1978). Self-regulating work groups: A socio-technical synthesis. *Academy of Management Review, 3*, 625–634.	529	
9. Salancik, G. R., & Pfeffer, J. (1978). A social information processing approach to job attitudes and task design. *Administrative Science Quarterly, 23,* 224–253.	3054	1372
10. Karasek, R. A. Jr. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24,* 285–308	8345	3477
11. Campion, M. A., & Thayer, P. W. (1985). Development and field evaluation of an interdisciplinary measure of job design. *Journal of Applied Psychology*, 70, 29–43.	197	55
12. Kohn, M. L., & Schooler, C. (1982). Job conditions and personality: A longitudinal assessment of their reciprocal effects. *American Journal of Sociology*, 87, 1257–1286.	752	361
13. Kiggundu, M. N. (1983). Task interdependence and job design: Test of a theory. *Organizational Behavior and Human Performance*, 31, 145–172.	289	121
14. Wall, T. D., Kemp, N. J., Jackson, P. R., & Clegg, C. W. (1986). Outcomes of autonomous workgroups: A long-term field experiment. *Academy of Management Journal*, 29, 280–304.	515	206
15. Fried, Y., & Ferris, G. R. (1987). The validity of the job characteristics model: A review and meta-analysis. *Personnel Psychology*, 40, 287–322.	1388	514
16. Marmot, M. G., Stansfeld, S., Patel, C., North, F., Head, J., White, I., & Smith, G. D. (1991). Health inequalities among British civil servants: The Whitehall II study. *The Lancet*, 337, 1387–1393.	2822	1571
17. Dean, J. W., & Snell, S. A. (1991). Integrated manufacturing and job design: moderating effects of organizational inertia. *Academy of Management Journal*, 34, 776–804.	425	180
18. Campion, M. A., Medsker, G. J., & Higgs, A. C. (1993). Relations between work group characteristics and effectiveness: Implications for designing effective work groups. *Personnel Psychology*, 46, 823–847.	2114	688
19. Barker, J. R. (1993). Tightening the iron cage: Concertive control in self-managing teams. *Administrative Science Quarterly*, 38, 408–437.	2177	706
20. Jackson, P. R., Wall, T. D., Martin, R., & Davids, K. (1993). New measures of job control, cognitive demand, and production responsibility. *Journal of Applied Psychology*, 78, 753.	441	201
21. Warr, P. (1994). A conceptual framework for the study of work and mental health. *Work & Stress*, 8, 84–97.	417	150
22. Xie, J. L., & Johns, G. (1995). Job scope and stress: Can job scope be too high? *Academy of Management Journal*, 38, 1288–1309.	326	148
23. Parker, S. K., Wall, T. D., & Jackson, P. R. (1997). That's not my job: Developing flexible employee work orientations. *Academy of Management Journal, 40*, 899–929.	403	151
24. Parker, S. K. (1998). Enhancing role breadth self-efficacy: The roles of job enrichment and other organizational interventions. *Journal of Applied Psychology*, 83, 835–852.	560	242
25. Parker, S. K., Wall, T. D., & Cordery, J. L. (2001). Future work design research and practice: Towards an elaborated model of work design. *Journal of Occupational and Organizational Psychology*, 74, 413–440.	396	149
26. Wrzesniewski, A., & Dutton, J. E. (2001). Crafting a job: Revisioning employees as active crafters of their work. *Academy of Management Review*, 26, 179–201.	1259	498
27. Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86, 499–512.	3291	1178
28. Bond, F. W., & Bunce, D. (2003). The role of acceptance and job control in mental health, job satisfaction, and work performance. *Journal of Applied Psychology*, 88, 1057–1067.	511	186
29. Morgeson, F. P., & Humphrey, S. E. (2006). The Work Design Questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology*, 91, 1321–1339.	721	290
30. Sonnentag, S., & Zijlstra, F. R. (2006). Job characteristics and off-job activities as predictors of need for recovery, well-being, and fatigue. *Journal of Applied Psychology*, 91, 330–350.	349	176
31. Humphrey, S. E., Nahrgang, J. D., Morgeson, F. P. (2007). Integrating motivational, social, and contextual work design features: a meta-analytic summary and theoretical extension of the work design literature. *Journal of Applied Psychology*, 92, 1332–1356.	741	316
32. Frese, M., Garst, H., & Fay, D. (2007). Making things happen: Reciprocal relationships between work characteristics and personal initiative in a four-wave longitudinal structural equation model. *Journal of Applied Psychology*, 92, 1084–1102.	253	119
33. Grant, A. M. (2007). Relational job design and the motivation to make a prosocial difference. *Academy of Management Review, 32,* 393–417.	602	261

(table continues)

Table 1 (*continued*)

Article	GS	WoS
34. Grant, A. M. (2008). The significance of task significance: Job performance effects, relational mechanisms, and boundary conditions. *Journal of Applied Psychology, 93*, 108–124.	351	148
35. Parker, S. K. (2014). Beyond motivation: Job and work design for development, health, ambidexterity, and more. *Annual Review of Psychology,* 65, 661–691.	27	6

Note. Citation data obtained on November 29, 2015 from GS (Google Scholar) and WOS (Web of Science). Bold indicates the article is published in the *Journal of Applied Psychology.*

strongly associated terms. Interestingly, each cluster maps closely onto a particular historical perspective on work design. Thus, the first and largest cluster of topics (red, $N = 235$ terms), labeled *sociotechnical systems and autonomous work groups*, reflects research emerging out of the sociotechnical systems perspective, including research on autonomous work groups. The second largest cluster (green, $N = 130$ terms), *job characteristics*, maps on to the highly influential job characteristics model of work design. The third cluster (blue, $N = 101$ terms), *job demands-control*, covers research topics spurred by *Karasek's (1979)* job demands-control model (e.g., job demand, work condition, decision latitude, physical demand, risk factor, psychosocial work environment, strain, job stress, depression, heart rate, physical symptoms, pain, musculoskeletal injuries, and smoking). The fourth cluster (pink, $N = 65$ terms; labeled *job demands-resources*) includes research on job demands (work load, role overload, work hour, job security, emotional demands, work pressure, hindrance) and job/personal resources (job resources, self-esteem, optimism, conservation). What distinguishes this cluster from the job demands-control one is its focus on the outcomes of engagement (absorption, dedication, personal accomplishment, vigor) as well as burnout (depersonal-

ization, exhaustion, cynicism). The final cluster focuses on the more specific role demands of role conflict, role ambiguity, and role overload, which in turn arose out of sociological and social psychological theories on roles. This distinct history is reflected in the fact that these role variables form a separate cluster in the scientific map (yellow, $N = 92$ terms, labeled *role theory*).

Next we elaborate each of the five work design perspectives that are reflected in discrete clusters in the scientific map, as well as some of the more contemporary work design perspectives that are not yet reflected as discrete clusters in the scientific map.

Sociotechnical Systems and Autonomous Work Groups

Early medical studies identified psychological and social factors as causing sickness among coal miners (e.g., Halliday, 1948), but it took *Trist and Bamforth (1951)* to link these problems to the way that work was designed. As these researchers observed, the traditional "hand-got" method of mining, in which small groups of self-managing and multiskilled colliers contracted with management to work a small coal face, was replaced by a mass production or "longwall" approach. The latter involved new technology (e.g.,

Figure 1. Cluster map of work design research in psychology/management journals.

conveyor belts) as well as a new social organization of work (40 to 50 men worked a long coal seam, each carrying out one task, managed by a set of deputies). The unpredictable conditions underground contradicted with the rigid work sequencing, creating conflict and causing a plummet in productivity. Later, Trist, Susman, and Brown (1977) observed that the destructive effects of the longwall method were alleviated when groups of miners found a way to autonomously complete whole tasks. Similar studies in Indian textile mills showed the benefits of optimizing both social and technical aspects of work (Rice, 1958), in what became known as the "sociotechnical systems" approach (*Cherns, 1976*).

Ultimately, applying sociotechnical systems principles led to the development of autonomous work groups (AWGs; see *Cummings, 1978*), teams that are also referred to as semiautonomous work groups and self-managing teams. In AWGs, teams carry out a relatively whole task, members have a range of skills, and the team has autonomy over when and how the work is done. Interdependence is also typically recognized as a defining feature of a team (*Kiggundu, 1983*). AWGs were most popular in Europe, especially Scandinavian countries with a strong history of industrial democratization, although they also spread to the U.S. and beyond.

In a review of 134 U.S. sociotechnical experiments, Pasmore, Francis, Haldeman, and Shani (1982) concluded this work design approach led to enhanced productivity, quality, and satisfaction, as well as lower costs, although they noted actual changes to technical systems were relatively infrequent. Further reviews of AWGs were similarly positive (e.g., Cohen & Bailey, 1997), as were studies of later reincarnations of the concept such as team empowerment (e.g., Kirkman & Rosen, 1999). Nevertheless, other reviews highlighted inconsistencies in outcomes (Guzzo & Dickson, 1996). For example, one study showed benefits of AWGs for employee satisfaction, but not for productivity (*Wall, Kemp, Jackson, & Clegg, 1986*). van Mierlo et al. (2005) attributed some of these inconsistencies to a failure to consider levels of analysis issues satisfactorily, a failure which is troubling given evidence of different findings at the individual and team level when both are considered (Langfred, 2000).

Other explanations of inconsistencies include: AWGs might enhance performance within the group, but not across groups (*Parker, 2014*); ineffective implementation of AWGs (Parker & Wall, 1998); and variations in task, team, or contextual characteristics that shape the relevance of AWGs, such as whether the level of interdependence in tasks is suited to team work (Wageman, 1995), the fit with the workforce (Guzzo & Dickson, 1996), the degree of operational uncertainty (Cordery, Morrison, Wright, & Wall, 2010), and level of support in the organizational context (Morgeson, Johnson, Campion, Medsker, & Mumford, 2006). The idea that autonomous work groups are always beneficial for employees has also been challenged by studies adopting a more critical approach. In a qualitative study, *Barker (1993)* showed that employees in autonomous teams exercised a high level of control over each other's behavior.

This highlighting of group dynamics as relevant to work design was a theme further developed in team effectiveness models proposed in the 1990s. Beyond work characteristics such as autonomy, these models highlighted aspects such as leadership, group composition, group processes, and the wider context as drivers of team effectiveness (Manz & Sims, 1987; *Campion, Medsker, & Higgs, 1993*; Cohen & Bailey, 1997). The emphasis on how

elements of a system might need to operate together to achieve higher-level outcomes is present in concepts like high performance work systems, although evidence suggests that, of the different elements, work design might be especially crucial in shaping organizational outcomes (Birdi et al., 2008).

The technological element of the sociotechnical systems approach has been less present in the literature. Exceptions include: discussions of how to design technology using sociotechnical systems principles (Clegg, 2000); studies of how teams adapt technology to achieve their goals (Majchrzak et al., 2000); and how technically oriented changes such as lean production and integrated manufacturing interact with work design (e.g., *Dean & Snell, 1991*; **Parker, 2003**). A more recent development is research on the design of virtual teams.

These developments and focus on the sociotechnical interface are reflected in the red cluster in Figure 1, which covers topics such as teams, work organization, and self-managing teams. Outcome variables include team performance, as well as more strategic outcomes like innovation and competitive advantage. The map also includes research with a social focus (e.g., networks, trust, information sharing, conflict) and technological focus (e.g., advanced manufacturing technology, total quality management). Of all clusters, this is the broadest, including topics such as human resource management, industrial relations, operations management, supply chain, knowledge management, and community. The cluster also includes contemporary topics such as virtual teams, telecommuting, and globalization.

Job Characteristics Model

At around the same time that the sociotechnical systems approach was being developed in Great Britain, U.S. scholars were exploring alternatives to mechanistic work designs. These explorations, which spanned 15 years, culminated in the Job Characteristics Model (JCM) of **Hackman and Oldham (*1975*, *1976*, 1980)**, by far the most influential model of work design.

The JCM is a logical conclusion of the field's interest in in understanding how work can satisfy fundamental human needs (McGregor, 1960). An important first step was the development of Motivator-Hygiene Theory. Through interviews of accountants and engineers, Herzberg, Mausner, and Snyderman (1959; *Herzberg, 1966*) concluded that only intrinsic work factors such as recognition and achievement were motivational in nature. Although this theory was largely discredited (Locke & Henne, 1986), it is important because it explicitly suggested that intrinsic job features impact motivation, which sparked interest in job enrichment and stimulated a stream of research that culminated in the development of the JCM.

The next major development was the research of Turner and Lawrence (1965). Using a sample of 470 workers in 47 jobs across 11 organizations, they showed that "Requisite Task Attributes" such as autonomy and responsibility were related to attendance and job satisfaction. Turner and Lawrence also identified "Associated Task Attributes," such as pay, cycle time, and level of mechanization. In addition to demonstrating relationships with outcomes, this research was influential because it developed measures of several important work characteristics, serving as the foundation for the next major publication by **Hackman and Lawler (*1971*)**.

In their JAP monograph, *Hackman and Lawler (1971)* examined how four "core" job dimensions (variety, autonomy, task identity, feedback) and two interpersonal job dimensions (dealing with others, friendship opportunities) related to internal motivation, job satisfaction, high quality work, and reduced absence in a sample of telephone company workers. Because only the four core job dimensions clearly related to outcomes, the importance of the two interpersonal job dimensions was discounted in the JCM.

In two significant studies using data from over 600 employees in 62 different jobs, **Hackman and Oldham** developed a measurement tool (**1975**; the Job Diagnostic Survey or JDS; the Job Characteristics Inventory, JCI by Sims, Szilagyi, & Keller, 1976, has been a popular alternative measure) and tested the underlying theory (1976; the JCM). Although the development of the JDS included seven job dimensions, only five were considered to be "core" (skill variety, task identity, task significance, autonomy, and feedback from the job itself). The basic idea of the JCM is that these job characteristics lead to three critical psychological states, which then lead to a set of personal and work outcomes. In addition, these relationships are proposed to be moderated by growth need strength, which is the "desire to obtain 'growth' satisfactions" from work (*Hackman & Oldham, 1975*, pp. 162–163). Although later formulations of the theory (Hackman & Oldham, 1980) identified other moderators (individual knowledge and skill, context satisfaction), they have been infrequently studied.

Despite criticisms (e.g., **Roberts & Glick, 1981**; *Salancik & Pfeffer, 1978*), the JCM was the dominant model of work design for many years and indeed is still highly influential. Indeed, *Hackman and Oldham (1975)* is the 2nd most highly cited JAP article of all time. Such influence is well-earned, as the five core work characteristics are related to a host of affective and behavioral outcomes (*Fried & Ferris, 1987*; *Humphrey, Nahrgang, & Morgeson, 2007*; **Loher, Noe, Moeller, & Fitzgerald, 1985**), although the specific model described by the JCM has received only limited support. For example, there is minimal support for the moderating role of growth need strength (Morgeson & Campion, 2003; Morgeson, Garza, & Campion, 2012; Tiegs, Tetrick, & Fried, 1992), and the specific mediational mechanisms have received limited support, with research suggesting that experienced meaningfulness is the key critical psychological state (*Humphrey et al., 2007*; Johns, Xie, & Fang, 1992). However, interactions between personality and work design (Raja & Johns, 2010) confirm the spirit of the JCM's prediction of individual differences in responses to work features.

Perhaps the most enduring legacy of the JCM is the codification and institutionalization of the five core job characteristics as key work features. Of course, many other work characteristics beyond the five shape motivation, an issue we return to when we discuss integrative perspectives on work design. Nevertheless, despite some limitations in the underlying theoretical model and its narrowness, the JCM has prompted much research and continues to be highly cited. Its dominance is reflected in the scientific map by the green cluster's size and density. Key work design variables indicated include job characteristics, job perceptions, job complexity, job feedback, task design, task variety, and skill utilization. Key outcome terms include job/work satisfaction, job performance, and intrinsic motivation. This cluster also includes topics related to job analysis (e.g., job analysis, judgment, applicant), suggesting a reasonably close tie between job analysis and job characteristics research.

Job Demands–Control Model

While all of the above was going on, rather independently, an equally important focus emerged concerning the impact of work design on physical and mental health, initiated largely by *Karasek's (1979)* job demands-control model. Interest in strain and health-related effects of work design emerged in the 1940s when scholars (e.g., Whyte, 1948) showed the dysfunctional effects of heavy workloads combined with limited decision latitude. Drawing on this research, *Karasek (1979)* argued that motivational job design research disregarded work demands, whereas large-scale epidemiological studies identifying the role of stress in mental health (e.g., Caplan et al., 1975) ignored job discretion. Key predictions of *Karasek's* model were that demands and control interact such that control can buffer the negative effects of demands, and that strain will be greatest when demands are high and control is low. In addition to control, Karasek and Theorell (1990) subsequently recognized social support as another antidote to job demands (see also Johnson & Hall, 1988).

There is now copious evidence supporting a positive association between job demands and stress and burnout (**Crawford, LePine, & Rich, 2010**; Schaufeli & Taris, 2014) and between stress and compromised physical health (e.g., Ganster & Rosen, 2013). Likewise, much research documents the positive impact of job control on well-being (see above). In part, excess job demands, or low control, damage health and well-being because they lower individuals' daily experiences of work recovery (*Sonnentag & Zijlstra, 2006*). The effects of demands and control on physical/mental health also vary for different individuals. For instance, *Bond and Bunce (2003)* showed employees high in psychological flexibility benefit most from high job control. However, support for the specific proposed interaction between demands and control is mixed and mainly negative (e.g., van der Doef & Maes, 1999), even among longitudinal studies vetted for quality (De Lange, Taris, Kompier, Houtman, & Bongers, 2003).

An advance in this literature has been to highlight that not all demands are created equal. For instance, **Cavanaugh, Boswell, Roehling, and Boudreau (2000)** proposed a distinction between hindrance demands ("bad stressors") and challenge demands ("good stressors"). The former, including organizational politics, role ambiguity, and role conflict (see next section), constrain goal attainment and personal development. The latter, including workload, time pressure, and responsibility, can contribute to personal development and career success. Although both challenge and hindrance demands are positively related to burnout, hindrance effects are stronger (**Crawford et al., 2010**). Also, challenge demands are positively related to job attitudes and performance and negatively related to turnover, whereas the reverse applies to hindrance demands (**Podsakoff, LePine, & LePine, 2007**). Given that one person's challenge might be another's hindrance, *Parker (2014)* argued for an approach that accounts for appraisals of demands (e.g., Ohly & Fritz, 2010). This approach avoids a priori categorization and also accommodates demands such as emotional labor, attentional demands, and responsibility for costs (*Jackson, Wall, Martin, & Davids, 1993*) that are prevalent but uncategorized.

Another research theme has been the possibility of curvilinear relationships. *Warr's (1984)* vitamin model proposed that most conventionally positive work characteristics will have diminishing returns on well-being over their range, and some will damage well-being at high levels. In samples with an adequate range on work characteristics, these propositions have been supported. For example, *Xie and Johns (1995)* found a U-shaped relationship between job complexity and emotional exhaustion. Such findings are important in light of the trend toward work design via restructuring in which disparate tasks are combined into "super jobs" that may greatly tax their incumbents. Relatedly, the idea that a job might be "too good" by conventional job design standards led Elsbach and Hargadon (2006) to prescribe the insertion of daily "mindless" work into creative professionals' jobs to curb the effects of excess richness. Indeed, Ohly, Sonnentag, and Pluntke (2006) found that some degree of task routinization contributed positively to proactive and creative job behavior, presumably by conserving cognitive resources.

Job Demands–Resources Model

The next development in this area was the introduction of the job demands-resources model (*Demerouti, Bakker, Nachreiner, & Schaufeli, 2001*). The job demands-resources model offered two important advances over *Karasek's (1979)* initial effort. First, it recognized the fact that other work features in addition to control and support (e.g., rewards, security) might serve as resources to counter job demands, stimulate growth, and foster achievement. Second, it actively incorporated both strain and motivation. Although allowing for an interaction between resources and demands, a key feature of the model is its assertion that demands primarily function to impair health, via strain and burnout, whereas resources lead to high levels of performance, via engagement. This dual-path quality recognized the essential need to consider multiple criteria when examining the impact of work design (Johns, 2010).

Although research has supported many predictions derived from variants of the demands-resources model (Schaufeli & Taris, 2014), and the model has been extended to other domains such as employee safety (**Nahrgang, Morgeson, & Hofmann, 2011**), predicted interactions between demands and resources remain elusive. Also, questions arise about the distinction between key constructs constituting the model: Are demands and resources conceptually distinct? That is, do poor resources constitute a demand (Schaufeli & Taris, 2014)? And are engagement and burnout conceptually distinct or the opposite ends of a continuum (Cole, Walter, Bedeian, & O'Boyle, 2012)?

Role Theory

The job demands-control/resources models encompass the demands of role conflict, role ambiguity, and role overload. Yet interest in these particular demands has a distinct history, which likely accounts for them having a separate cluster in the scientific map. In 1964, well before the introduction of *Karasek's (1979)* model, Kahn et al. (1964) introduced role conflict and role ambiguity as two key types of stressful role dysfunction. It is beyond the scope of this article to review in full this literature, but one key point is that much evidence shows the negative effects of role ambiguity and conflict on outcomes such as turnover, commitment, and job strain (**Fisher & Gitelson, 1983**; Jackson & Schuler, 1985; *Rizzo, House, & Lirtzman, 1970*). The role perspective has also expanded to consider roles outside of the work place. Although work-family issues are a distinct topic in and of themselves, work can be designed in ways that support, or interfere with, nonwork goals (**Frone et al., 1992**).

Rather than considering role characteristics as an independent variable, or a job demand, a different approach concerns investigating when, how, and why people expand or change their work roles. Ilgen and Hollenbeck (1991) argued that, whereas jobs focus on established and objective task elements, roles are broader and include emergent and self-initiated elements.[1] Job crafting (*Wrzesniewski & Dutton, 2001*) refers to the process by which individuals cognitively and behaviorally shape their roles to enhance their sense of meaning. *Judge, Bono, and Locke's (2009)* study identified a crafting type of process as one explanation of why individuals with high core self-evaluations tend to end up in more complex jobs. In a similar vein, but coming at the topic from an active performance perspective, *Parker et al.'s (1997)* concept of role orientation captures how individuals construct their roles in different ways, with this study showing that autonomous work designs promote flexible role definitions that in turn predict job performance. Job autonomy also promotes role breadth (**Morgeson et al., 2005**), role breadth self-efficacy (*Parker, 1998*), personal initiative (*Frese, Garst, & Fay, 2007*), and proactive work behavior (**Parker et al., 2006**), with evidence showing that each of these role attitudes and behaviors enhances job performance (Grant & Parker, 2009). Research on roles is reflected in the yellow cluster that, as well as topics relevant to role demands, captures topics concerned with the social and constructed nature of roles (e.g., socialization, newcomer adjustment, crafting, role innovation) and a broad array of outcomes (e.g., citizenship, organizational commitment, self-efficacy).

Integrative and Contemporary Perspectives

The foregoing shows the vast literature on work design within the field of psychology and management appears to coalesce into five broad clusters that, in turn, have a clear parallel with historical perspectives. On the one hand, this mirroring of history in current clusters of research is to be expected. On the other hand, the fact that the clusters so strongly reflect history—as opposed to reflecting similarity of topics—implies that there could be important synergies across research areas that are currently not being exploited. For example, when researchers assess the effects of job characteristics, there is no reason why they should not transcend the traditional JCM outcomes like performance and turnover (cluster 2) to consider outcomes such musculoskeletal symptoms, role innovation, or burnout (clusters 3, 4). The more integrative and contemporary perspectives on work design that we describe in this section—which are not reflected as discrete clusters—can help link these domains.

One big picture integrating perspective is what has been referred to as an interdisciplinary perspective. Campion and colleagues

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[1] Although rarely acknowledged, this distinction is highly similar to Turner and Lawrence's (1965) "prescribed" and "discretionary" task elements.

(e.g., *Campion & Thayer, 1985*; **Campion, 1988**) identified four distinct work design "models" that draw from unique disciplines. This includes the mechanistic (i.e., scientific management and the industrial engineering approach focused on maximizing efficiency) and motivational (i.e., the organizational psychology approach focused on maximizing job satisfaction and motivation) models we have already discussed, along with two other disciplinary approaches: The biological model from ergonomics and medical sciences that emphasizes work design to maximize comfort and physical health, and the perceptual-motor model from experimental psychology and human factors that considers the attentional and informational demands of the work. This interdisciplinary model highlights the distinct benefits and trade-offs of each disciplinary-based approach, which can be particularly helpful when designing or redesigning work (Morgeson & Campion, 2002). Despite its interdisciplinary focus, there remained gaps in construct coverage and measurement (Edwards, Scully, & Brtek, 1999), suggesting the need for additional integrative work design research and conceptualization.

Building on Parker and Wall (1998), and linking their ideas to changes occurring in modern work as well as the workforce, *Parker, Wall, and Cordery (2001)* developed an elaboration of the JCM that proposed an expanded set of job characteristics, as well as extended outcomes, mediators, moderators, and antecedents of work design. Morgeson and Campion (2003) reached a similar conclusion, which *Morgeson and Humphrey (2006)* then built on to develop the Work Design Questionnaire (WDQ). The WDQ assessed work design characteristics included in existing models (e.g., **Campion, 1988**; *Hackman & Lawler, 1971*; *Hackman & Oldham, 1975*) as well as a host of specific work characteristics identified in the literature (e.g., *Karasek, 1979*; **Wall, Jackson, & Davids, 1992**; *Kiggundu, 1983*; **Wong & Campion, 1991**). The taxonomic approach resulted in an integrative set of 21 work characteristics spanning task, knowledge, social, and contextual domains. As such, it includes work design elements from across the four work design models identified by **Campion (1988)**. This model was validated in a sample of 540 incumbents across 243 different jobs and has been used for meta-analytic (*Humphrey et al., 2007*) and primary (e.g., **Grant, 2008**) research studies. The diverse set of work characteristics in the WDQ enables a more complete consideration of the modern work environment (*Parker et al., 2001*).

Two additional contemporary perspectives deserve mention. First, building on earlier social perspectives such as *Salancik and Pfeffer (1978)* and the integrative model of Morgeson and Campion (2003), *Grant (2007*, p. 395) developed the idea of "relational work design," which focuses on the "relational architecture of jobs that increases the motivation to make a prosocial difference by connecting employees to the impact they are having on the beneficiaries of their work." Empirical research has supported and extended this conceptual model (e.g., **Grant, 2008**; Parker, Johnson, Collins, & Nguyen, 2013). This important research explicitly acknowledges that work exists in a social context that can have a profound impact on employees.

Second, *Parker (2014)* has advanced a learning and development approach to work design. This perspective draws from a diverse body of research showing that jobs with certain characteristics, such as high demands and control (Karasek & Theorell, 1990), autonomy (**Wall, Jackson, & Davids, 1992**), and complex

work with low supervision (*Kohn & Schooler, 1982*), can promote worker learning and development. A learning mechanism is distinct from the traditional motivational focus of the JCM and acknowledges that work design might promote moral, cognitive, and personality development. **Li, Fay, Frese, Harms, & Gao (2014)**, showed that job demands and control predict the development of a more proactive personality, which in turn has lagged beneficial effects on work characteristics. Similarly, the work of Wu, Griffin, and Parker (2015) showed that job autonomy predicts the development of a more internal local of control, which then predicts later job autonomy. This focus on learning and development as a result of work design dovetails with advances in the careers field, such as O'Mahony and Bechky's (2006) research showing that contract workers intentionally engage in 'stretch-work' (work that includes some aspects which exceed existing competencies) to build their skills over their career. Likewise, coming from a careers perspective, Hall and Heras (2010, p. 455) advocated the need to design 'smart jobs' that "contribute to an enhancement of the adaptive capabilities and self-identity of the employee."

Summary of Key Work Design Perspectives

Spurred by problems arising from job simplification and scientific management, multiple perspectives on work design have emerged. Five clusters of research can be readily identified in a scientific map, with each of these clusters clearly reflecting historical developments. More recently, integrative perspectives have arisen. Figure 2 synthesizes the various work design perspectives, summarizing how each has developed over time (note that the closely related job demands-control/job demands-resources/role theory perspectives are grouped together because of insufficient space in the figure).

Nevertheless, we need to go further in these efforts to build bridges across different perspectives. For example, as the scientific map shows, there is a marked distance between the more individualist research clusters (job characteristics model, job demands-control model, job demands-resources model, and role theory) and the more team/system-level research cluster (sociotechnical systems theory and AWGs). As we discuss later, a multilevel model of work design might bring these areas closer. Such bridge-building is important as the field becomes more diverse. It can be seen, for example, that whereas the dense areas of the scientific map match well-established concepts (e.g., job characteristics, demands, teams), around the periphery we see that work design research includes a wide range of topics; from more macrooriented variables such as globalization (red cluster) to physical health topics such as heart disease (blue cluster) to individual concepts like extraversion (yellow cluster) to socially oriented topics such as public sector motivation (yellow cluster).

Work Design Research in JAP

JAP has published proportionately more articles on work design than other top tier journals. We analyzed the number of articles published in JAP over time relative to those published in six other top tier journals (using the same classification as *Humphrey et al., 2007*) and those published in the management/psychology field (see Figure 3). This analysis shows that, since appearing in the mid
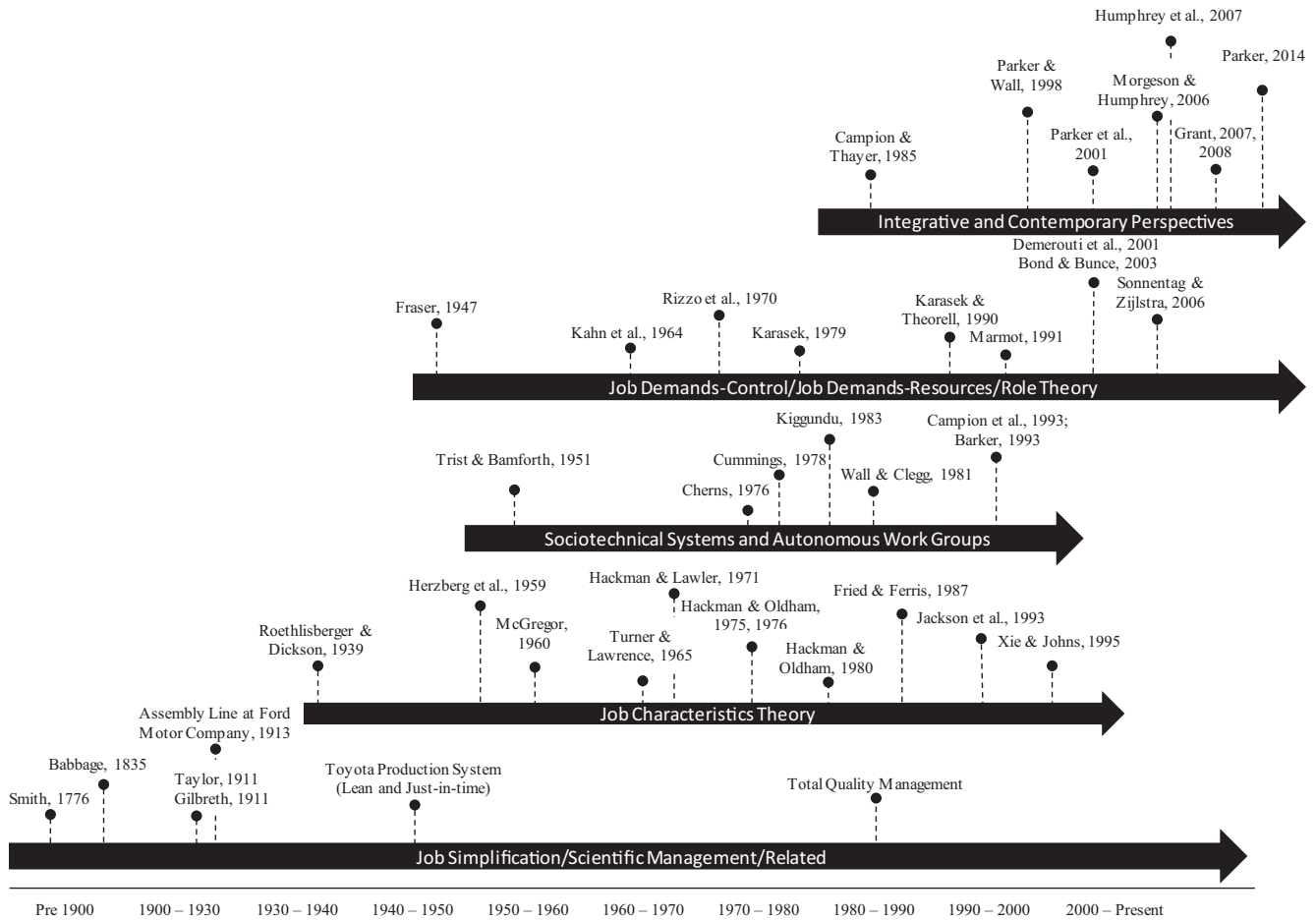
Figure 2. Timeline of key developments in the field of work design.

1970s, work design publications in JAP fluctuate a bit, but are reasonably constant overall (on average, 5.5, 8, 5, 8, and 11 articles per year from 1970–1979, 1980–89, 1990–1999, 2000–2009, and 2010–2014, respectively). There is a similar pattern of constancy for other top tier journals. It is noteworthy that overall, JAP has published about the same number of work design articles ($N = 366$) as the other top tier journals *combined* ($N = 397$), showing that, proportionately, JAP publishes more on work design than other top tier journals.

Perhaps even more striking, and consistent with the conclusion from *Humphrey et al.* (*2007*), this analysis shows that number of work design publications in the wider management/psychology literature has increased dramatically since the mid 1980s and is now almost seven times greater than equivalent set of publications in top tier journals or in JAP. In other words, at least in terms of quantity of publications, work design as a research topic has tended to flourish most outside of JAP and other top tier journals.

When it comes to quality and influence, however, it is clear that JAP has been and remains a leading vehicle for work design research. Twelve percent (over one third) of the top 35 influential articles (see Table 1) were published in JAP. Some of these work design articles represent the most highly cited JAP articles ever: *Hackman and Oldham* (*1975*) is the second most highly cited JAP

paper; *Demerouti et al.* (*2001*) is the ninth, and *Hackman and Lawler* (*1971*) is the 14th most cited JAP article in its history. Moreover, citation analyses of the more than 5000 work design articles in psychology and management shows that those published in JAP are the most cited by a significant margin ($N = 46,469$ citations in Web of Science), more than double the number of citations relative to work design related articles published in *Academy of Management Journal*, the next most cited ($N = 19,823$). Citation numbers of work design articles published in the next five journals are as follows: *Administrative Science Quarterly* (18,567); *Organizational Behavior and Human Decision Processes* (17,416); *Journal of Organizational Behavior* (13,261); *Harvard Business Review* (10,935); and *Journal of Management* (10,153). Put differently, work design articles are published across more than 400 different journals, and yet JAP articles are cited 13.3% of the time whenever a work design article is cited.

Although JAP publications represent just 6.4% of the total number of published work design articles in the psychology/management field (366 in JAP of 5,708 articles), their influence is three times that figure (46,469 citations of JAP articles relative to approximately 250,000 citations of articles from the top 60 journals, or 19%).
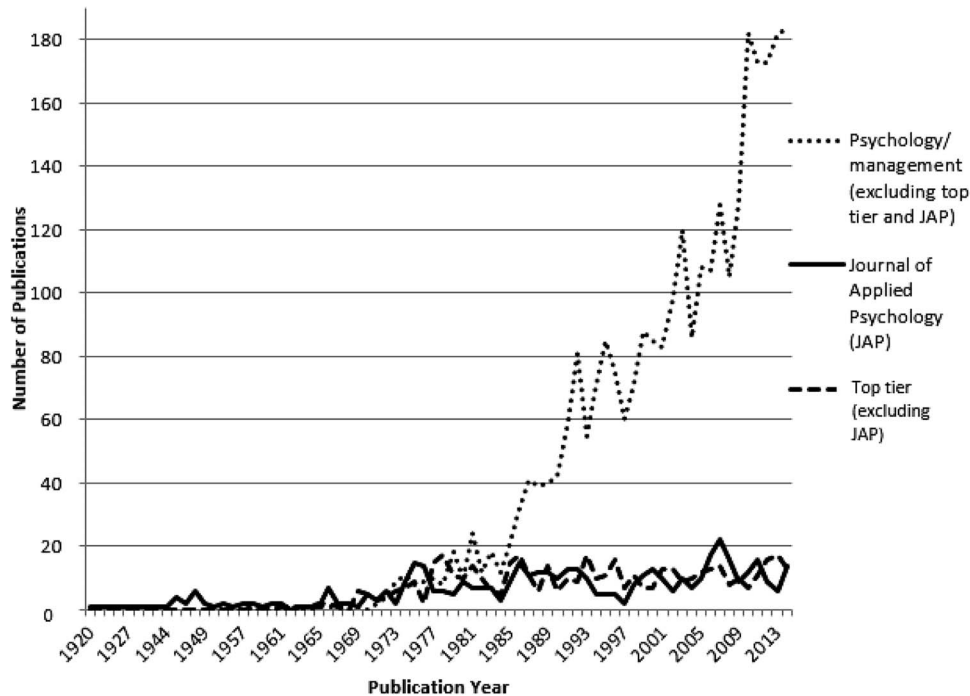
Figure 3. Number of work design articles appearing in the *Journal of Applied Psychology*, top tier journals (excluding JAP), and in psychology/management journals from 1920 to 2014.

In regard to what types of work design topics are covered in JAP, we repeated the science mapping exercise reported earlier, focusing only on work design articles published in JAP. The cluster map from this analysis is shown in online supplemental material (Resource 2), Figure A (see also Table B). This map depicts four clusters derived from 34 concepts: (a) job characteristics model, (b) role theory; (c) job demands-control model and job demands-resources model; and (d) work-family interface. The map has a reasonably similar underlying structure compared with the psychology/management map, although there are also some key differences between the maps. Notably, the JAP map is much narrower in its coverage of concepts relative to the psychology/management map. For example, the JAP map excludes many work design aspects (e.g., emotional labor, mental work load) and many outcomes (e.g., physical health-related outcomes, knowledge management). In addition, the "sociotechnical systems and autonomous work groups" cluster from the broader field is missing in the JAP structure. Thus, the latter excludes concepts such as lean, telecommuting, system, virtuality, and human resource management, in part perhaps reflecting that research on some of these topics tends to be qualitative or case study based, methods that have not typically been JAP's focus. This does not mean that these topics are disregarded entirely by JAP, just that they are much less frequent. For example, there are few articles on self-managing teams or autonomous work groups in JAP. This is consistent with the review of **Cascio and Aguinis (2008)**, who found that less than 3% of the articles appearing in JAP over a 45 year period were on the topic of groups or teams. Although there are an emerging number of articles in JAP on team empowerment, these often do not link explicitly to work design literature, even though that connection would make sense.

In sum, JAP is a significant and influential outlet for work design research. However, whereas the broader field of work design has extended its reach into a wide array of topics, including more sociotechnical, macro, and contextualized topics, as well as many more publications concerning physical health, these are not present in JAP. There is no compelling reason why JAP should omit these broader topics, albeit with a psychological and rigorous viewpoint, which in turn requires that editors recognize some of the challenges of field work that is highly contextualized and value outcomes such as job stress and injury.

Contributions of Work Design Research

Work design research and theory has significantly contributed to academic research, management thinking, and practice and policy, as we elaborate next.

Impact on Academic Research Within the Discipline and Beyond

Is the work design research and theory discussed above important within our own field? The answer to this is quite straightforwardly yes: work design is recognized as a key antecedent of most of the major dependent variables we focus on in the field of psychology and management including productivity, well-being/strain, absenteeism, presenteeism, job satisfaction, organizational commitment, job performance, creativity, and more. Work design is also recognized as a mediator between other variables and outcomes (e.g., between leadership/downsizing/lean production/employment contracts/etc. and outcomes), as well as an outcome of individual processes such as job crafting.

The contribution of work design research to the psychology/ management field is shown by the sheer number of articles in this body of work ($N = 5,708$ articles) and the many citations to these articles (well over 250,000 citations). Moreover, in an analysis of the value of various theories in organizational behavior (OB), Miner (2003) highlighted the usefulness of work design theory. He evaluated 73 OB theories using 95 expert judges (past presidents of AOM, past editors/board members of top tier management journals) to assess each on a range of criteria. The Job Characteristics Model was one of just eight theories rated as simultaneously high on scientific validity and applied utility. Sociotechnical systems theory was rated as moderate in scientific validity and high in usefulness. Herzberg's Motivation Hygiene theory and Scientific Management were both rated low on scientific validity and questionable in terms of usefulness.[2] It is interesting that job characteristics theory and sociotechnical systems theory both remain dominant today as shown by their large clusters in the scientific map, providing some validity to Miner's conclusion about their value.

But does the academic reach of work design theory extend beyond our own field? The answer to this question also appears to be yes, albeit with scope for more impact. If we extend our analysis beyond psychology/management, there are more than 17,000 articles that include work design topics in their title or abstract (see online supplemental material [Resource 2]). These articles occur in fields such as ergonomics, health care, medicine, epidemiology, economics, engineering, operations management, industrial relations, and sociology. Examples include: *Industrial Relations*, such as how self-managing teams (but not team work in general) promote employee motivation and welfare (Gallie et al., 2012); *nursing*, such as how "core problems in work design . . . threaten the provision of care" (Aiken et al., 2001); *marketing*, such as how empowering work designs affect customer-contact employees (Hartline & Ferrell, 1996); *clinical science*, such as work design in relation to back pain (Hoogendoorn et al., 2000), and *engineering/operations management*, such as how to design work to improve lean systems (Shah & Ward, 2003). Many of these articles cite work design research from our field. For example, *Hackman and Lawler's (1971)* JAP article, cited 1010 times (WOS), has obviously been well cited in our field (a total of 479, 335, 174, and 48 WOS citations, respectively, are in management, 'psychology applied,' business, and psychology journals), but also often in other fields such as industrial relations (42 citations), sociology (37 citations), education (30 citations), nursing (15 citations), social work (15 citations), and criminology (15 citations).

Some of the articles in disciplines beyond psychology/management, however, are not just instances of application, but they extend work design research. Particularly important are prospective, large scale, and rigorous studies in the health/epidemiology fields. An example is the Whitehall longitudinal studies that have tracked the work design and health of more than 10,000 British civil servants since 1967. In a highly cited article published in *The Lancet*, *Marmot et al. (1991*; cited 1555 times in WOS) showed that individuals in lower status jobs have a higher risk of morbidity. There are similar high impact studies in outlets such as the *Scandinavian Journal of Work, Environment & Health* (e.g., Kivimäki et al., 2006; cited 306 times in web of science) and the *American Journal of Public Health* (e.g., Johnson & Hall, 1988, cited 835 times in WOS).

One concern is that many of these epidemiological studies tend not to be very well linked to psychology and management work design research, especially that published in JAP. The same issue applies in the field of economics. For example, from the perspective of optimizing incentive payments, Holmstrom and Milgrom (1991; cited 1288 times in WoS) concluded that work should be specialized so that one person is assigned hard-to-monitor tasks whereas another is assigned easy-to-monitor tasks. The reference list in this paper did not include any psychology or management work design articles. Several similar articles advocate how to design jobs according to economic principles with little or no link to psychological theory (e.g., Graham et al., 2015). Perhaps a richer perspective could be developed if such economic research drew upon existing work design theories, and of course vice versa.

Impact on Management Thinking

Another way to assess impact in our field is to examine whether work design research affects management thinking, such as manifested by its appearance in the practice-oriented management literature. There is no clear agreed way to assess this question since practical outlets are many and varied. Thus, we focused on Harvard Business Review (HBR) as an exemplar outlet. HBR is widely circulated among practitioners and managers (Rynes et al., 2007), and is the most assigned journal in selected online business course syllabi (Kousha & Thelwall, 2008). We analyzed the content of articles in recent HBR issues to establish the contemporary relevance of work design. Of the 178 articles (excluding letters) published in 2014 and in the first few months of 2015, 24% ($N = 44$) of the articles had clear work design content and a further 24% ($N = 43$) were highly relevant to work design. Thus, in total, almost half of the articles had relevance to work design. Examples include: Fernandez-Araoz (2014) in "21st Century Talent Spotting" on the importance of job rotation for developing talent; Nidumolu et al. (2014) on how global sustainability requires collaboration via multidisciplinary teams; Zweig (2014) in "Managing the Invisibles" on the importance of intrinsically interesting work for managing less visible high performers; Moritz (2014) on how job flexibility and other work design elements can engage Millennial staff; and Kuehn (2014) on how a health care professional team in Uganda, in response to increasing numbers of AIDS patients, introduced "task shifting" involving pharmacists doing some of the work carried out by doctors, freeing up their time for patient care. Many further examples show work design is important in contemporary conversations about managing talent, boosting innovation, and enabling outcomes like virtuality and sustainability. It is nevertheless intriguing to observe that, with one exception, none of these articles contained the terms "job design," "work design," "job characteristics," "job autonomy," or "job demands" in their abstracts or titles. The topic of work design is thus often central to business and organizational discussion, and

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[2] This result surely reflects the organizational behavior bias of the judges. Core scientific management principles are at the heart of all major production system innovations of the last 100 years (i.e., the assembly line, Toyota production system, just-in-time, lean production), all of which have demonstrated significant organizational utility and practical usefulness.

yet it is not explicitly referred to using the language more commonly used by academics. Work design is perhaps so ubiquitous in its breadth of application that the impact of the topic is somewhat obscured.

Top selling business press books also often feature work design, albeit without explicit reference to this term. One example is Hammer and Champy's (2006) *Reengineering the Corporation: A Manifesto for Business Revolution,* identified by Forbes (2002) as one of the most influential business books ever. This book advocates restructuring jobs to remove process fragmentation, thus providing task identity. A further example is Maitland and Thompson's (2014) book on *Future Work,* which extensively highlights virtual work design, job autonomy, and empowerment as necessary for success in today's dynamic world. A final example is Grant's (2013) *Give and Take*, named one of the best books of 2013 by the *Financial Times,* which is a practical version of the relational work design approach discussed above.

The notion that work design is highly relevant in contemporary management literature, albeit not necessarily expressed using traditional academic language, is further shown in an analysis of word usage of digitalized books available on Google[3] (see online supplemental material [Resource 4]). Our analysis shows that references to scientific management peaked around 1918 and then declined, whereas core work design terms (job design, work design, job characteristics, job demands/control, sociotechnical, role conflict and other role demands) all peaked in the early 1980s with a decline thereafter. However, in contrast to these traditional terms, there is a dramatic increase in the use of terms associated with teamwork as well as clear increases in the use of newer terms such as empowerment, demands, time pressure, emotional demands, cognitive demands, and electronic monitoring, thus showing the continued contemporary relevance of work design issues.

Impact on Work Design Practice and Policy

Are core work design research ideas embedded in actual work design practice? On the one hand, surveys of work practices (usually targeting human resource managers) suggest high prevalence of enriched work designs such as high involvement work practices, self-managing teams, and empowerment (see, e.g., Lawler, Mohrman, & Benson, 2001). However, analyses that directly ask employees tend to offer a less rosy picture. For instance, the 2006 national British Skills Survey, showed that 58.9% of employees reported working in teams, but only 14.2% of employees reported working in self-directed teams (Gallie et al., 2012). As a further example, in the Fifth European Working Conditions Survey (2010), of 44,000 workers across 34 European countries, over one fifth of jobs have poor intrinsic quality. A further 20% of jobs involve highly demanding work. Finally, in an analysis of U.S. work, Vidal (2013, p. 598) concluded: "Low autonomy jobs accounted for around 41 per cent of total employment in 1960 but continue, after 45 years of technological progress, to account for fully 35 per cent of total employment." Sociological analyses likewise highlight that, even when new jobs are designed, they are not necessarily well designed from a psychological perspective, and some scholars suggest that efforts to standardize work and lower discretion may even be increasing in professional contexts.

The continued prevalence of simplified work, and the growing levels of excess demands in some jobs, is no doubt part of the

reason why work design continues to be an important policy agenda in many countries. Government agencies in most countries have departments with responsibility for health and safety at work (see, e.g., NIOSH in the United States, the Ministry of Health, Labor, and Welfare in Japan), which in turn stimulate a policy-related focus on work design. Work design also often features in government policies concerned with national productivity (e.g., work place innovation, skill development) and ageing. For example, the UK Commission for Employment and Skills (2009) argued that government policy needs to move away from focusing purely on the development of skills to instead place more attention on skill use within the workplace, which is enabled through good work design. As well as government, other stakeholders have a policy interest in work design. By way of illustration, in Australia, a Mentally Healthy Workplace Alliance[4] includes government agencies (e.g., Safe Work Australia), business representative bodies (e.g., The Australian Chamber of Commerce and Industry), professional associations (e.g., Australian Psychological Society), and not-for-profit associations/charities (e.g., Beyondblue).

Of course, the sophistication of policy, and its actual impact on practice, varies considerably across nations for many complex reasons (see, e.g., Holman, 2013). The key point is that the topic of work design is on the policy agenda in most nations, both from an economic and a health perspective. And it should be. Although there is much practitioner-oriented discussion about work design, good quality work designs are not so prevalent as to make further research on the topic redundant. Indeed, as we discuss next, we need more research into how to better embed good work design into practice (that is, work design as an outcome rather than as an antecedent).

Roadmap for Future Research

In Table 2 we synthesize the main ideas for further research that have been made in the past decade in reviews, special journal issues, and meta-analyses (see online supplemental material [Resource 4] for a list of these articles). Here we briefly recap some of these directions, and then suggest some of our own perspectives for advancing the field.

Scholars have urged more complete assessments of work characteristics. This includes calls for attention to social, relational, cognitive, and physical aspects of work beyond the traditional 'motivating' characteristics; assessing multiple aspects of work design at the same time, such as including motivating work characteristics when assessing job/role demands; and the need to better address work characteristics relevant to broader changes occurring in work, such as electronic performance monitoring, cognitive demands, and emotional labor. More unusually, scholars have argued we need to consider how distinctive configurations of work design characteristics might create synergistic effects. Similar calls have been made to consider more comprehensive outcomes of work design. For example, it will often make sense to include motivation, strain, and health outcomes within a single study, in part so trade-offs can be examined. Measuring outcomes of work

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[3] For more detail see https://books.google.com/ngrams.
[4] http://www.headsup.org.au/training-and-resources/mentallyhealthy-workplace-alliance

Table 2
Future Directions for Work Design Research Summarized From Multiple Reviews and Meta-Analyses (See Online Supplemental Material [Resource 5])

Theme	Examples
Work characteristics	• Extended work characteristics (e.g., 'strategic significance' instead of task significance; social, relational characteristics; extended job demands) • Configurations/profiles of work characteristics
Outcomes	• Expanded outcomes, such as work design effects on: skill and learning; cognitive, moral, identity development; organizational-level outcomes like ROI; co-ordination/knowledge-sharing outcomes; safety and injury prevention; active vs passive mental health; development of swift trust; etc. • How work design at one level affects outcomes at the next level; multiple outcomes at once; and trade-offs amongst outcomes
Mechanisms	• Alternative mechanisms (e.g., knowledge; different types of motivation; team coordination processes; effects on identity) • Better understanding of mechanisms (e.g., underpinning health effects)
Moderators/context	• Incorporate context (e.g., occupational, cultural, etc.) • Effect of demographics (e.g., work-family issues; gender; ageing) and changing work (e.g., global/distributed teams, communities of practice)
Antecedents/influences on work design	• Influences on work design (e.g., national-level influences on work design; managerial choices; leadership); process of work design; how/why job simplification gets perpetuated • Top down and bottom up work design processes simultaneously (e.g., how autonomy affects crafting)
Focus	• Work design as a proactive strategy for addressing change in the work place • Work design as part of broader systems (e.g., high performing work systems; links to other employment practices like wages) • Career/vocational issues in work design • Co-production of work design with customers/clients
Methods and approach	• Level issues (e.g., project, task, day work design); multi-level; individual/ team dynamics. • Time/temporal issues; dynamics in work characteristics; non-linear effects; thresholds (e.g., when is strain damaging) • More ethnographic/qualitative studies; intervention studies

design over longer periods, and with enough measurement waves to test theory about temporal processes, is also needed.

Once we have expanded outcomes, it is then of course sensible, indeed necessary, to expand the mechanisms that link work design inputs to outcomes. For example, researchers have often argued for the need to consider individual-level mechanisms beyond intrinsic motivation (e.g., alternative forms of motivation, learning, knowledge sharing) as well as expanded team-level mechanisms (e.g., the development of swift trust, implicit task coordination, the occurrence/prevention of fault-lines). Once again, when we expand work characteristics, outcomes, and mechanisms, this gives rise to the need to recognize different moderators. For example, in a study concerned with how the level of team autonomy affects the development of swift trust, an obvious moderator to consider might be geographic virtuality.

We certainly concur with, and echo, the need for the above expansions to our field. But at the same time, we advocate a reorientation of the dialogue. There is a somewhat passive feel to the above agenda. For example, rather than asking 'how does work design affect an expanded array of outcomes?,' we propose that one ask 'what is the role of work design in achieving important outcomes?' In the words of *Parker (2014)*, "we need to expand the criterion space . . . not just by adding extra dependent variables to empirical studies but by exploring when, why, and how work design can help to achieve different purposes" (p. 16.23).

As an example, a promising area is the role that work design might play in shaping, or protecting, personal and occupational identity. For instance, Eriksson-Zetterquist, Lindberg, and Styhre (2009) recounted how centralized Internet purchasing technology reduced the autonomy of purchasing personnel, precluding their direct interaction with suppliers and damaging their professional

standing. Christensen and van Bever (2014, p. 67) described how electronic spreadsheets became the "fast food of strategic decision making," abrogating managerial judgment and shifting power from executives to Wall Street analysts. These examples suggest that active consideration of work design may provide a constructive way to shape identity dynamics in the context of technological change. Thus, designing enriched jobs might lead to adaptive identities that are an asset in the changing world of work: they are associated with viewing work as a calling (Bunderson & Thompson, 2009) or at least an unfolding career (Skorikov & Vondracek, 2011), and *Parker (2014)* asserted that they might encourage people to experiment with new identities in line with the notions of provisional selves (Ibarra, 1999) or future work selves (**Strauss, Griffin, & Parker, 2012**). On the other hand, if technology is implemented in such a way that it is allowed to deskill jobs, we might provoke a schism in which people behave at work in ways that belie their identity, with negative consequences for effectiveness.

In essence, then, we propose work design as a powerful vehicle for mitigating potential negative effects (and enhancing potential positive effects) of technological and social change, as well as for enabling these changes to be more effective. This approach builds on studies showing that the effects of various practices (e.g., downsizing, temporary work, lean production) can be improved through good work design (Parker & Wall, 1998). Such a proactive perspective is likely to become even more vital in the light of work changes. Take, for instance, the trend that computers and robots are increasingly replacing humans, leaving only high-skilled, complex jobs and low-skilled jobs that involve nonroutine physical elements (e.g., care work). For these jobs that remain, achieving good quality work design with reasonable level demands will

become a more important issue than ever. But even more crucially than tracking how computerization affects work, we should be asking: 'what types of work design will enable more effective adaption to computerization?' For instance, how should tasks be allocated among people, and between people and computers, to maximize health, safety, and productivity? Related proactive questions include: how can work design help combat the negative health consequences of increasingly sedentary work? How can work design help keep mature workers in work? What is the role of work design in reducing gender inequities or other forms of disadvantage? How might work design reduce growing levels of underemployment within our society?

There are methodological implications of this more proactive approach focused on how work design can enable positive outcomes, or at least mitigate negative ones, of broader-scale change. First, this approach implies intervention studies (or at least longitudinal tracking) in which work redesigns are monitored over time. Second, it assumes a dynamic perspective to work design. Most research has treated work design as a stable feature of work in which it is assumed that work characteristics are static. Yet, we know that the work environment is dynamic and that numerous factors impinge upon work design (Parker, Van den Broeck, & Holman, 2017). For example, individuals routinely craft their own work, implying change (Morgeson et al., 2005); novel and disruptive events can exert a significant impact on work (Morgeson, Mitchell, & Liu, 2015); individuals often work across multiple, and frequently changing, teams, with work characteristics varying across these teams; and the external context can shape work design (Dierdorff & Morgeson, 2007). We need to ask questions such as: what work characteristics evidence more variability over time, and what might cause this variability? And how would variability itself (regardless of the work characteristic) affect the range of outcomes discussed in this review?

Third, a proactive role of work design in relation to technological change is, in essence, a reaffirmation of the sociotechnical systems perspective that social and technological aspects of work must be jointly considered. Thus, our final recommendation is one we have made already, which is that we need to build better bridges between sociotechnical systems perspectives and the individual work design perspectives, with the latter having dominated JAP. In part, this is about addressing levels issues in empirical studies (van Mierlo et al., 2005), and conducting more contextualized studies of work design. But it is also about developing a multilevel theory of work design that brings together individuals, teams, and the context (Johns, 2006), as well as giving more attention to the sociopolitical forces that shape work design (*Parker, 2014*).

Conclusion

Work design research has had a long and illustrious history. It is one of the first areas in industrial and organizational psychology subject to rigorous scientific study, it has had a significant impact on management thinking and, to some extent, practice, and it has had a deep and wide impact on academic research and theory. We have learned an enormous amount about how to design work, the costs and benefits of different types of work design, and how and why work design leads to a diverse set of outcomes. Of course,

there is always more to learn, and here we have highlighted several important research needs moving forward.

We close with some more wise words from **McChesney** (**1917**) 100 years ago:

> Every man should be more of a man, a better man, for having worked a day. The humdrum shop, operated by humdrum workmen, managed by humdrum superintendents, dominated by humdrum ideals, should be banished to Humdrum Land, if for no other reason than to save the men.

We concur with McChesney (with the extension to also save the women!). We hope that our article helps, like many before it published in JAP, to banish bad jobs to Humdrum Land.

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