

# ORGANISATIONAL PSYCHOLOGY

**\*\*REVISITING\*\***  
THE CLASSIC STUDIES

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## Work Design: Revisiting Lillian Gilbreth's Fatigue Studies

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### BACKGROUND

Historically, research on work design, or the content and organisation of one's work tasks, activities, relationships, and responsibilities (Parker, 2014), can be traced back to the rise of machine-operated work during the Industrial Revolution. Early in the twentieth century, the traditional practice of craftsmanship gradually started to be replaced by a new philosophy advocating that each person should only perform one single, specific function at work. This principle of functionalisation was central to Frederick Winslow Taylor's (1911) *Scientific Management*, a popular management theory that aimed to maximise efficiency in the workplace by breaking down work into basic operations and to redesign jobs to be highly simplified and standardised. Taylor's approach emphasised the importance of using time and motion studies to analyse existing jobs so as to scientifically determine the 'best' (most efficient) way for executing tasks (Sullivan, 1995).

First applied by Frederick Taylor in 1881 in the Midvale Steel Company in Philadelphia, the method of time study focused on timing the different procedures of a given work operation and identifying a standard time to perform the work. Later, Frank Gilbreth developed a complementary method called motion study. As the owner of a construction company, Frank sought to improve bricklayers' working methods (Krenn, 2011). Instead of just timing operations as did Taylor, Frank measured the movement patterns of bricklayers. Frank used motion study to identify a reduced set of fundamental and standard motions thereby minimising fatigue in bricklayers (Gilbreth, 1911). Various employers experimented with methods of time and motion study, the best-known being Henry Ford, who succeeded in reducing the assembly time for a Model T automobile from over 12 hours to 90 minutes.

The initial success of scientific management and its methods quickly resulted in the widespread adoption of job simplification as the preferred form of work design in manufacturing and other sectors (Davis, 1966). Despite its popularity, however,

scientific management was also strongly criticised by opponents who argued that it was a dehumanising approach, transforming people into machines (Sullivan, 1995). The implementation of simplified work design often meant an increased degree of control over employee behaviour by managers who believed that workers lacked both the competency and motivation to oversee organisational activities (Hackman & Oldham, 1980). For instance, Frederick Taylor allegedly said that the ideal worker for shovelling pig iron should be 'as stupid as an ox' (Kelly & Kelly, 1990, p. 121). Unsurprisingly many workers suffered under Taylor's approach to work design, resulting in negative outcomes like job dissatisfaction, absenteeism, turnover and even formal legislation prohibiting the use of stopwatches to time workers' performance (Kelly & Kelly, 1990; Parker, 2014).

Against this background, we illuminate the work of Lillian Gilbreth who was a silent pioneer in research on work design and one of the earliest scholars to develop a humanistic view on scientific management. Specifically, we will focus on two of Lillian's core works in this chapter, *The Psychology of Management* and *Fatigue Study: The Elimination of Humanity's Greatest Unnecessary Waste*, to showcase her ground-breaking human-centred approach to work design.

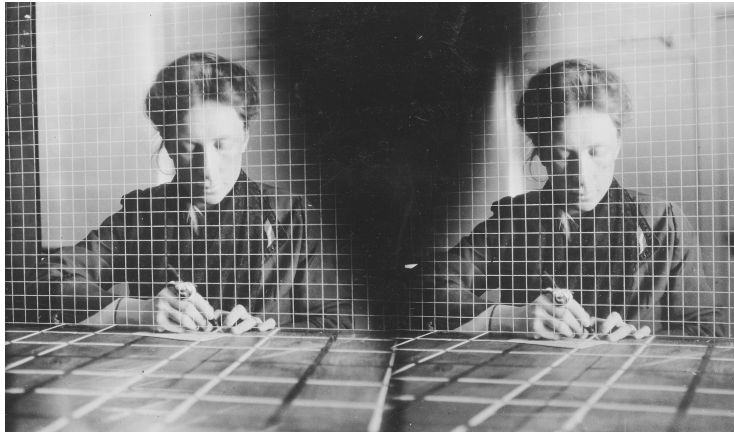
## DETAILED DESCRIPTION

### GILBRETH'S FATIGUE STUDIES

**B**orn on May 24 in 1878 in California as the oldest child of Ann and William Moller, Lillian Gilbreth grew up as a shy girl with a keen interest in music and literature, spending her high school days writing poetry for the school paper and making up lyrics for her self-composed songs. Although her father initially objected to the idea of her attending university in favour of staying home and learning to keep house, Lillian – encouraged by her favourite aunt Lillian Delger Powell – prepared herself for a professional career, assuming she was too plain for any man to marry her anyway. Her dream was to go to Columbia University to study with Brander Matthews, a world-renowned professor in English literature. However, with Brander refusing to teach women and Lillian falling ill soon after, she had to give up on that dream. She returned home to obtain her master's degree in English at the University of California – later she would also obtain her dissertation at this university (Kelly & Kelly, 1990; Miller & Lemmons, 1998; Yost, 1949).

The next summer on their way to Europe, Lillian's chaperone introduced Lillian to Frank Gilbreth during a stop in Boston. They got on so well that they later married on 19 October 1904. Frank convinced Lillian to shift the topic of her dissertation to psychology, foreseeing it would complement his own research on scientific management. For instance, their book *Motion Study: A Method for Increasing the Efficiency of the Workman* (Gilbreth, 1911) reflected Lillian's growing understanding of the psychology of workers. Afraid of damaging the book's credibility, however, the publisher did not want to include Lillian as a co-author, so Frank received all the credit as sole author (Kelly & Kelly, 1990; Krenn, 2011). Despite

men dominating the management literature in the early twentieth century, Lillian did manage to publish her dissertation in 1914 as a book entitled *The Psychology of Management* using her initials, as publishers wished to keep her gender a secret (Kelly & Kelly, 1990; Koppes, 1997; Miller & Lemmons, 1998; Yost, 1949).



**Figure 1.1** Stereograph of Lillian Gilbreth in motion study lab, undated.

*Courtesy of Purdue University Libraries, Karnes Archives and Special Collections.*

With *The Psychology of Management* (Gilbreth, 1914), Lillian contributed to the literature on work design in a ground-breaking way. She was one of the first to introduce a human-centred approach to work design, combining insights from psychology, management and engineering (Kelly & Kelly, 1990; Sullivan, 1995). Although Lillian saw great value in Frederick Taylor's principles to improve the efficiency of the production process, she felt that by focusing on the *managing* part of the organisation only, scientific management neglected another vital part almost entirely: the best interest of the *managed* (Gilbreth, 1914). Contrary to Taylor, Lillian Gilbreth was interested in the psychological dimension behind work efficiency or how workers experience work. She stated this explicitly in her dissertation:

*The emphasis in successful management lies on the man, not on the work; that efficiency is best secured by placing the emphasis on the man, and modifying the equipment, materials and methods to make the most of the man.* (Gilbreth, 1914, p. 344)

Contrary to engineers and managers who focused dominantly on machines, products, and profits, Lillian started from workers' psychological needs to develop work methods that could improve their happiness and health. Lillian argued that work design should allow individuals to express themselves and realise their potential, founded in the belief that worker well-being was a key asset for organisations (Sullivan, 1995).

## FATIGUE STUDY

The complementary nature of Lillian's interest in the realisation of human potential and Frank's focus on improving work efficiency was most visible in their joint publication of the book *fatigue study* (Krenn, 2011). The goal of fatigue study was to eliminate all unnecessary waste of human energy caused by needless effort in industrial operations (Gilbreth & Gilbreth, 1916). Specifically, fatigue study aimed to help workers overcome fatigue and conserve their energy by developing optimal work methods and engaging in so-called *betterment work*, adapting working conditions to fit the needs of workers (e.g. using adjustable chairs, adaptable worktables and proper work clothing) (Kelly & Kelly, 1990). Betterment work included the creation of the best resting conditions for workers by for instance installing home reading boxes – a library of books and magazines that workers could take home to relax and educate themselves. Rather than limiting productivity, Lillian and Frank saw rest as a critical factor for organisational success, arguing that workers had a duty to rest to be able to think clearly (Gilbreth & Gilbreth, 1916). To achieve these goals, fatigue study relied not only on the measurement of workers' movements, methods and results, but also on the study of workers' fatigue – the rest interval needed to recover – as an indicator of their work efficiency: the smaller the rest interval that workers needed to recover, the higher their perceived work efficiency.



**Figure 1.2** Lillian Gilbreth viewing movies demonstrating motion study, undated.

*Courtesy of Purdue University Libraries, Karnes Archives and Special Collections.*

As explained in the introduction to this chapter, the key measurement methods the Gilbreths used to investigate fatigue were the time and motion study: timing the elements of the best method known and then dividing the work into its most

fundamental motions which they called *therbligs* (Gilbreth, 1914). Specifically, Lillian and Frank used *micromotion* to record motions, tools, and surroundings aided by cinematography and special clocks. In addition, they used the *cyclograph method* to record and visualize the orbit or path of a (cycle of) motion(s) by attaching small electric lights to the hands or other body parts of the workers (Gilbreth & Gilbreth, 1916). Lillian and Frank analysed the data to develop procedures of least waste by getting rid of useless motions and recombining the remaining motions in an optimal manner. Besides synthesising a standard time to do a piece of work, they also standardised rest periods for workers to overcome fatigue. For instance, Lillian described significant changes made to the process of handkerchief folding based on the results of time and motion studies:

*Each hour was divided into ten periods. The first four periods, that is, the first twenty-four minutes, the girl remained seated. She worked five minutes and rested one; again worked five minutes and rested one. That is to say, she had four minutes' rest out of the twenty-four, and spent this rest seated so that she might lose no time in getting back to the work. The next two periods, that is, for twelve minutes, the girl was standing.* (Gilbreth, 1914, p. 128)

Under the new standard conditions, the girls produced over three times the amount of their best work produced prior to the study, while showing more interest in their work than before and experiencing the same fatigue (Gilbreth, 1914). Besides determining a standard work method for workers, Lillian and Frank also standardised working conditions such as the colour, shape, size, weight, location, position and texture of walls, tools, furniture and clothing of workers. For example, when applying the fatigue study to the assembly of a braider – a machine for manufacturing braid – the Gilbreths optimised the positioning of assembly materials and the design of the worktable. They arranged parts of the used work sequence and placed tools on the table in standard positions so that the workers could grasp, transport, and release these in the least fatiguing way (Gilbreth, 1914). Lillian noted that the new method increased the output from 18 to 66 braiders per person per day with no added fatigue. Interestingly, Lillian and Frank also showed a remarkable eye for detail. They advised providing machinery with a dull black finish, for instance, because the shiny nickel polish that organisations typically used taxed workers' eyes and caused fatigue (Gilbreth & Gilbreth, 1916).

## WELFARE

The main purpose of the standardisation of work resulting from Lillian and Frank's time and motion studies was the elimination of unnecessary fatigue to conserve workers' energy. In their fatigue study, they moved beyond the dominant focus on efficiency outcomes in terms of objective clock time and economic output by emphasising workers' subjective work experience – how workers felt at work. Lillian and Frank wrote that the fatigue study must increase *happiness minutes*, arguing that work was less fatiguing when workers enjoy what they are doing and

are able to work with ease (Gilbreth & Gilbreth, 1916; Krenn, 2011). Therefore Lillian urged managers to ask themselves the following question:

*Have you reason to believe that your workers are really happier because of the work that you have done on fatigue study? Do they look happier, and say they are happier? Then your fatigue eliminating work has been worthwhile in the highest sense of the term, no matter what the financial outcome. (Gilbreth, 1914, p. 150)*

According to Lillian, the fatigue study contributed to workers' general welfare allowing them to live a fuller life both inside and outside of work (Gilbreth, 1914). For instance, she described how some principles of the psychology of scientific management could stimulate the physical, mental, and moral development of workers, including:

- Individuality: workers should perform tasks that fit best with their abilities.
- Cooperation and empowerment: managers should actively involve workers in the process of work redesign.
- Squareness: the fatigue study should inform the work of all workers equally and workers should receive a fair compensation for improvements.

Contrary to Taylor, Lillian advocated the active involvement of workers in the process of work design as she felt they were best placed as specialists to provide the planning department with constructive criticism and suggestions for improving operations (Kelly & Kelly, 1990; Krenn, 2011). At the same time, Lillian also emphasised the importance of workers receiving a 'square deal' to prevent the fatigue study from becoming 'a new scheme for taking advantage of them' (Gilbreth, 1914, p. 157).

For Lillian, the fatigue study stimulated interest in workers for their work, appealed to workers' personal judgment, and developed their reasoning powers in constant efforts to improve existing work methods in cooperation with management (Gilbreth, 1914). She silenced objections of people who criticised scientific management for alienating workers from work and turning them into mindless robots, arguing that – when applied properly – scientific approaches to management can enrich workers' lives:

*Far from making machines out of the men, standardization causes a mental state that leads to invention, for the reason that the worker's brain is in most intimate contact with the work, and yet has not been unnecessarily fatigued by the work itself. No more monotonous work could be cited than that of that boy whose sole duty was to operate by hand the valve to the engine, yet he invented the automatic control of the slide valve used throughout the world today. (Gilbreth, 1914, p. 180)*

## IMPACT OF THE CLASSIC STUDY

By adopting a human-centred approach to scientific management and focusing on job enrichment instead of job simplification (Krenn, 2011), Lillian laid the

foundation for the field of management and work design to move into a new direction. Unfortunately, being a female academic in the then male-dominated field of management studies, Lillian received little acknowledgment for her contributions and the revolution her work could have sparked at the time did not happen. The shift in focus of work design research only took place five decades later when a new generation of researchers (e.g. Emery and Trist, Herzberg, Vroom, Hackman and Oldham) started advocating the same ideas about how work design could support the satisfaction of human needs (Sullivan, 1995).

For example, Lillian's core idea to look at the interaction between people and machines when improving work design was present in Emery & Trist's (1969) sociotechnical systems theory. Instead of either designing people out of the system or micromanaging them as was common practice in Tayloristic systems, socio-technical theory emphasised the importance of the joint optimisation of social and technical aspects of work (Clegg, 2000). This early theory of work design found its origin in Trist & Bamforth's (1951) now seminal study linking social and psychological problems in workers to the design of their work in the coal mines of Great Britain – 'the longwall method of coal getting'. They observed that, by changing from a 'hand-got' method in which miners dug out coal in small teams to a mechanical process in which miners operated in shifts spread out over long distances, social bonds weakened and problems with miners' morale appeared (Trist & Bamforth, 1951). These insights, in turn, inspired research on the power of self-managing teams – teams whose members have a range of skills and can autonomously complete an entire task (Cummings, 1978).

Lillian's ideas have featured prominently in later motivational theories of work design as well. For example, in his motivation hygiene theory Herzberg (1966) made a distinction between intrinsic work factors (e.g. achievement, recognition, responsibility) and extrinsic work factors (e.g. salary, relation with supervisor, job security) arguing that the former are stronger predictors of worker satisfaction while the latter better predict worker dissatisfaction. Here, Herzberg echoes Lillian who almost 50 years prior to the development of his two-factor theory distinguished between workers' natural instincts to work (e.g. ambition, pride) and external rewards and punishments (e.g. bonus, fine) as direct and indirect incentives, respectively (Gilbreth, 1914). Furthermore, Lillian acknowledged that people desire different rewards and managers should couple workers' performance to the rewards they desire (Gilbreth, 1914). This idea is central to Vroom's (1964) expectancy theory suggesting that workers are motivated when they expect that their efforts will have a positive impact on performance and good performance will lead to rewards that meet workers' specific needs.

Early motivational theories on work design stimulated the development of the now famous job characteristics model (JCM) (Hackman & Oldham, 1975, 1976), which aimed to identify the characteristics of jobs that foster a state of internal work motivation in workers (Oldham & Hackman, 2010). In the JCM, Hackman and Oldham highlighted five core job characteristics that determine the motivating potential (MP) of a job – the power of that job to tap into workers' intrinsic work motivation. These included:



- Skill variety: the degree to which a job involves the use of different skills in carrying out the work.
- Task identity: the degree to which a job requires the completion of a whole and identifiable piece of work.
- Task significance: the degree to which a job has a substantial impact on the lives or work of other people.
- Autonomy: the degree to which a job provides freedom to the individual in scheduling and choosing work methods.
- Job feedback: the degree to which a job provides direct and clear information about the effectiveness of workers' performance.

Although to our knowledge Hackman and Oldham did not reference Lillian Gilbreth, similar ideas about the importance of workers' subjective work experience and job enrichment evident in Lillian's work are at the heart of the JCM. At the same time, Hackman and Oldham extended Lillian's work as well as that of others by being the first to develop a testable and useful model of good work design for organisations. The five key job characteristics were argued to lead to positive work outcomes via three critical psychological states (perceived work meaningfulness, feelings of personal responsibility for work results, understanding of one's work performance) (Hackman & Oldham, 1975, 1976) which, in turn, were theorised to generate positive work outcomes. Early tests of the model using the job diagnostics survey (JDS), a measurement instrument to assess the presence of job characteristics, showed results that were particularly strong for affective reactions (e.g. satisfaction, motivation) (Hackman & Oldham, 1976).

A further important work design theory is Karasek's (1979) job demands-control model that introduced the importance of work demands and additionally focused on strain as an outcome (see Chapter 7 this volume). This model proposed that jobs combining high demands with high control were most motivating, whereas jobs that were highly demanding but gave no control to workers would increase their risk for psychological and physical strain. The importance of control for workers builds on Lillian's work on the need to empower and involve workers as a principle of the psychology of scientific management (Gilbreth, 1914). Karasek's (1979) insight that control helped workers cope with high demands, however, extends Lillian's work that focused mainly on decreasing demands by removing excessive motions and managing fatigue with rest periods.

In conclusion, even though Lillian Gilbreth was one of the first to propose that organisations should invest in making work more motivating for workers by designing it in a way that serves their needs instead of the other way around, the JCM and the demand-control model offered scholars more specific frameworks to study this broad proposition.

## KEY REPLICATIONS AND GENERALISATIONS

After Hackman and Oldham's development of the JCM, studies on work design increased dramatically focusing on testing and extending the model (Oldham & Hackman, 2010; Parker et al., 2017). Over time, reviews and meta-analyses have provided convincing evidence for the positive impact of certain job characteristics on workers' attitudes and performance (Fried & Ferris, 1987; Humphrey et al., 2007; Morgeson & Humphrey, 2006). For example, Fried and Ferris (1987) showed that the relationship between job characteristics and work outcomes was generally stronger and more consistent for workers' attitudes (e.g. job satisfaction) compared to their behaviours (e.g. work performance). Thirty years later, Humphrey et al. (2007) reviewed 259 studies involving 219,625 participants and concluded that work design explained on average 43 per cent of the variance in workers' attitudinal and behavioural work outcomes. Interestingly, the impact of job characteristics was stronger for subjective than objective performance, with the latter predicted only by job autonomy (Humphrey et al., 2007).

In line with Lillian's early ideas on the importance of workers' subjective work experience, the meta-analytical studies partially supported the mediating role of workers' psychological states in the relationship between job characteristics and work outcomes (Fried & Ferris, 1987). Experienced work meaningfulness proved to be the key psychological state mediating the job characteristics-work outcomes relationship (De Boeck et al., 2019; Humphrey et al., 2007). Moreover, research confirmed Hackman and Oldham's proposition that individual differences influence workers' reactions to work design (Raja & Johns, 2010), although it failed to support concrete predictions about the moderating role of 'growth need strength' in the relationship between job characteristics and work outcomes (Johns et al., 1992; Tiegs et al., 1992). Overall, there is substantial support for Lillian's human-centric approach to work design as evidenced by the high scientific validity and practical usefulness of the JCM (Miner, 1984; Oldham & Hackman, 2005).

Unsurprisingly, although the JCM is still popular (Parker et al., 2017), it has not been free from criticism. One critique has been about the use of workers' subjective perceptions to measure job characteristics. Salancik & Pfeffer (1978) started questioning the results of the JCM from a social processing perspective, arguing that workers construct the characteristics of a job as a function of their social context and past experiences. This critique does not refute the validity of the JCM, however, as past research has found objective and subjective measures of job characteristics to be related (Fried & Ferris, 1987) and evidenced the validity of using perceptions to measure job characteristics (Parker, 2014).

The JCM has undergone considerable adaptations over time (Oldham & Hackman, 2005). First, researchers have expanded the JCM by broadening the initial set of job characteristics (Humphrey et al., 2007; Morgeson & Humphrey, 2006; Parker et al., 2001; Grant, 2007). Morgeson & Humphrey's (2006) work design questionnaire (WDQ) includes motivational, social, and contextual work characteristics. *Motivational characteristics* encompass both the classic JCM characteristics as well

as knowledge characteristics, reflecting demands regarding workers' knowledge, skills, and abilities (e.g. job complexity). *Social characteristics* include interactional factors related to the relational architecture of jobs (e.g. social support) (Grant, 2007). Finally, *contextual characteristics* reflect the physical environment of work including physical demands, work conditions, and ergonomics (Morgeson & Humphrey, 2006). Besides being more comprehensive, the WDQ is also more sound methodologically with high scale reliability and consistent factor solutions making up for some psychometric issues of the JDS (Idaszak & Drasgow, 1987; Taber & Taylor, 1990).

A further adaptation is the refinement of the JCM over time with researchers systematically exploring alternative mediators, moderators and outcomes (Parker et al., 2001). For instance, due to the limited evidence for the mediating role of experienced responsibility and knowledge of results, studies investigated other motivational mechanisms such as the promotion of role breadth self-efficacy (Axtell & Parker, 2003; Parker, 1998), as well as non-motivational mechanisms such as willingness to respond quickly to changes. Researchers have also explored outcomes beyond those originally specified in the JCM including workers' physical and mental well-being as well as their learning related to cognitive and moral processes (Parker, 2014). For example, Demerouti et al.'s (2001) job-demands resources model suggests a dual-path with resources promoting well-being in workers via engagement and demands impairing workers' health via strain. This research goes back to Lillian's ideas about how work design could contribute to workers' happiness as well as their cognitive and moral development by cultivating personal responsibility and responsibility for others (Gilbreth, 1914; Gilbreth & Gilbreth, 1916).

## BEYOND GILBRETH'S FATIGUE STUDIES: THEORETICAL DEVELOPMENTS

**W**e started this chapter by discussing Lillian Gilbreth and her pioneering proposition that organisations should design jobs to be motivating for workers and less fatiguing, thereby shifting the focus from the work to the workers and their interests. We further described how the same fundamental belief in *job enrichment* later became the foundation of Hackman and Oldham's more tangible JCM that triggered an explosion of research testing and refining work design theory. In this section, we will focus on further theoretical developments that are currently happening in work design research. Specifically, we will address two emerging topics: the process of (bottom-up) work design and work design in a connected and digital world.

### THE PROCESS OF (BOTTOM-UP) WORK DESIGN

An important topic emerging in the work design literature has to do with our limited understanding of the antecedents of work design (Parker, 2014). Researchers – including Lillian and others discussed in this chapter – have traditionally

approached work design in a top-down manner assuming managers design jobs to meet specific goals and/or work design is the result of decisions made higher up in the organisation (Cohen, 2013; Parker, 2014). Yet, empirical studies on the process of how managers design work remain scarce (Parker et al., 2017). Exceptions include qualitative papers showing that work design is the product of a social and ongoing process (e.g. Barley, 1986; Cohen, 2013) and depends on individual factors such as the work designer's capacity and willingness to enrich jobs (Parker et al., 2019). For example, Cohen (2013) found that multiple organisational actors designed together the job of a DNA sequence operator in face of new technology.

The relative absence of knowledge about how managers design work contrasts with the exponential surge in research on job crafting or the 'bottom-up' process through which workers proactively design their own jobs to achieve a better person-job fit (Tims et al., 2012; Wrzesniewski & Dutton, 2001). The interest in this proactive, bottom-up approach to work design reflects a shift from studying the jobs of manual labourers in manufacturing organisations – as studied by Lillian Gilbreth – to enriching the jobs of managers, professionals and knowledge workers (Oldham & Hackman, 2005, 2010). Arguably, for individuals in higher and more autonomous positions, job crafting represents a useful strategy to shape work in function of their personal expertise and career aspirations, while providing them with a means to manage excessive demands (Parker, 2014). Recent reviews have shown that workers craft their own jobs – confirming Lillian's assumption that workers are motivated to improve their own work design – and that this is significantly related to outcomes such as engagement, burnout and work performance (Bruning & Campion, 2018; Lichtenthaler & Fischbach, 2016; Rudolph et al., 2017; Zhang & Parker, 2019).

## WORK DESIGN IN A CONNECTED AND DIGITAL WORLD

A second set of topics emerging in the work design literature has to do with changes in the economic context as well as growing technological innovations in organisations. Today, knowledge and service work, rather than manufacturing, dominate developed economies. Thus researchers are increasingly focused on the work design of professionals and knowledge workers (Grant & Parker, 2009; Parker, 2014; Oldham & Hackman, 2010). For instance, one important work transformation that is currently taking place is the rise in collaboration between people both in- and outside of organisational boundaries (Grant & Parker, 2007), leading to a much stronger focus on the 'social systems of work' (Grant, 2007; Grant & Parker, 2009). Building on earlier interactional perspectives (Salancik & Pfeffer, 1978), Grant (2007) argued that jobs that provide workers with opportunities to interact with and have an impact on others (e.g. clients), will increase workers' effort and helping behaviours via processes of prosocial motivation – the desire to bring benefit to others (Parker, 2014). Similarly, scholars have emphasised the need to integrate insights from networks and teams in work design (Kilduff & Brass, 2010; Morgeson & Humphrey, 2008), and to focus on social characteristics such as social support and feedback (Morgeson & Humphrey, 2006; Humphrey et al., 2007).

Technological innovations in the form of digitalisation are also drastically changing the jobs of many contemporary workers (Frey & Osborne, 2017 not in refs). Although our understanding about the impact of digital technology on work design in these jobs is still limited, machine-learning enabled the ability of machines to be ever more autonomous, which has critical implications for the task and control structure of work, including for knowledge and professional jobs (Parker & Grote, 2020). To date, most research has been adopting a passive perspective focused on how workers need to adapt to technology, but Parker & Grote (2020) have called for researchers and practitioners to consider how organisations could design work proactively to minimise potential risks in terms of workers' safety, performance and well-being, while maximising the opportunities provided by new technologies. For example, designed by technologists with little attention to worker experiences, the contemporary practice of algorithmic management tends to increase management control over workers and intensify workers' workload (Parent-Rocheleau & Parker, 2021). An emphasis on the joint optimisation of social and technical aspects of work is consistent with past theory on sociotechnical systems (Trist & Emery, 1969, 2005), with research from this perspective showing that technological changes are more likely to fail when organisations merely adopt a techno-centric approach that neglects the human side of things (Clegg & Shepherd, 2007). The need for a sociotechnical perspective in today's digital world is a continuation of Lillian's call for an emphasis on workers' experiences, not just machines.

## CONCLUSION

Over 100 years have passed since Lillian Gilbreth pioneered a human-centred approach to work design in her dissertation 'The Psychology of Management' and subsequent work. Contrary to her contemporaries who concentrated solely on managing, Lillian was among the first to highlight the importance of considering the interests and needs of those being managed. In doing so, Lillian advanced thinking on work design by introducing job enrichment and rightfully earned herself the title of 'first lady in management' (Koppes, 1997; Krenn, 2011). Her ideas feature prominently in later motivational theories of work design such as Hackman and Oldham's JCM. Although workers today face different challenges caused by the increasingly complex, interactive and digital nature of work, problems still occur because organisations prioritise profits and technology over human welfare. Therefore it seems timely to reinvigorate Lillian's work and call for a more human-centred approach to work design.

## IMPLICATIONS FOR PRACTITIONERS

One might argue that poor work design is less of a problem in today's knowledge economies because work is more enriched than before. Research

partially supports this thesis showing that on average jobs offer a greater level of skill variety to workers and provide them with more autonomy than in 1975 (Wegman et al., 2018). The gains in skill variety and autonomy are overshadowed, however, by recent losses in task identity and task significance due to ICT and automation (Wegman et al., 2018). Moreover, EU population statistics evidence that poor work design is still prevalent in modern societies with 20 per cent and 13 per cent of workers, respectively, holding poor-quality and overly demanding jobs (Sixth European Working Conditions Survey, 2016). Further, routine-biased technological change and offshoring are polarising job quality and thereby increasing the gap between low- and high-quality jobs (Goos et al., 2014). In a book on meaningless jobs, Graeber (2018) describes numerous examples including Clarence who was hired by a major global security firm as a guard for a museum and who testified: 'My job was to guard that empty room, ensuring no museum guests touched the ... well, *nothing* in the room, and ensure nobody set any fires. To keep my mind sharp and attention undivided, I was forbidden any form of mental stimulation, like books, phones, etc. Since nobody was ever there, in practice I sat still and twiddled my thumbs for seven and a half hours, waiting for the fire alarm to sound' (p. 95).

The result of societal and technological changes is that, on top of new pressing problems (e.g. burnout), problems of the past such as job dissatisfaction, absenteeism, poor performance and turnover still haunt contemporary organisations (Oldham & Hackman, 2010). A human-centred approach to work design provides organisations with an evidence-based way to improve the quality of work and make people love work more than hate it (Parker et al., 2017). Organisations can also indirectly support good work design by influencing the motivation, knowledge, skills, and abilities of, and opportunities for managers and other workers who are responsible – formally and/or informally – for designing work (Parker et al., 2017). Important to keep in mind is that work design both shapes and is shaped by the broader work context and therefore organisations should strive for alignment between both (Parker et al., 2017). For example, Campion et al. (2005) suggests to pair motivational work design such as highly autonomous jobs with commitment-based HR configurations (e.g. mentoring programmes) to achieve alignment.

Work design also offers practitioners a valuable perspective to understand the effects of technological changes on workers (Parker & Grote, 2020). As illustrated by Eriksson-Zetterquist et al. (2009), new technologies can disrupt good work design by reducing opportunities for workers to use their personal judgment and interact with others, which can diminish the perceived meaningfulness of the job. In this respect, it is important for organisations to design work in such a way that it allows workers to adapt to change by providing opportunities to explore and experiment with different professional identities, for instance. Finally, besides looking at how to adapt work roles to technology, organisations should also consider the proactive design of technological change in a human-centred way that maximises positive outcomes for workers (Parker & Grote, 2020).

## DISCUSSION QUESTIONS

1. What parallels do you see when comparing Lillian Gilbreth's early ideas on scientific management with the motivational theories on work design that were developed afterwards?
2. Scientific management has been criticised for turning people into robots by standardising their work. Lillian did not agree with these criticisms but, on the contrary, saw some opportunities for workers arising from the standardisation of work. What positive worker attitudes and behaviours were likely to result from standardisation according to Lillian? What principles need to be met for these outcomes to occur?
3. To what extent is the job of Clarence, the museum guard, described in the section on Implications for Practitioners an example of poor work design? Which work characteristics do you see as problematic? Give an example of how Clarence could redesign his job in a bottom-up way?

## FURTHER READINGS

Gilbreth, L. M. (1914). *The Psychology of Management*. Sturgis & Walton.

This is the main publication of Lillian Gilbreth's doctoral thesis, where she explains how psychology is imperative to make progress in the field of management. In the book, Lillian offers a comprehensive overview of the key principles of scientific management while integrating key insights from psychology.

Gilbreth, F. B. & Gilbreth, L. M. (1916). *Fatigue Study. The Elimination of Humanity's Greatest Unnecessary Waste*. Sturgis & Walton.

In this book, Frank and Lillian Gilbreth describe fatigue study, which combines time and motion studies to eliminate unnecessary fatigue and standardise working methods. It provides an interesting illustration of how both perspectives focusing on efficiency and on workers' experience were in fact complementary.

Hackman, J. R. & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance*, 16(2), 250–79.

Hackman and Oldham describe the theory behind the Job Characteristic Model as well as the empirical evidence provided by a large-scale study that they conducted at the time.

Parker, S. K. (2014). Beyond motivation: Job and work design for development, health, ambidexterity, and more. *Annual Review of Psychology*, 65: 661–91.

Parker reviews the literature on motivational work design and discusses the importance of more recent theoretical developments.

Parker, S. & Grote, G. (2020). Automation, algorithms, and beyond: Why work design matters more than ever in a digital world. *Applied Psychology: An International Review*, Advance online publication. doi: <https://doi.org/10.1111/apps.12241>

Parker and Grote outline that work design plays a central role in understanding the effects of technology, including how work design and technology shape and are shaped by each other.

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