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We propose that organizations use a new framework of workday design to enhance the creativity of today's chronically overworked professionals. Although insights from creativity research have been integrated into models of work design to increase the stimulants of creativity (e.g., intrinsic motivation), this has not led to work design models that have effectively reduced the obstacles to creativity (e.g., workload pressures). As a consequence, creative output among professionals in high-workload contexts remains disappointing. In response, we offer a framework of work design that focuses on the design of entire workdays rather than the typical focus on designing either specific tasks or very broad job descriptions (e.g., as the job characteristics model in Hackman et al. 1975). Furthermore, we introduce the concept of "mindless" work (i.e., work that is low in both cognitive difficulty and performance pressures) as an integral part of this framework. We suggest that to enhance creativity among chronically overworked professionals, workdays should be designed to alternate between bouts of cognitively challenging and high-pressure work (as suggested in the original model by Hackman et al. 1975), and bouts of *mindless* work (as defined in this paper). We discuss the implications of our framework for theories of work design and creativity.

Key words: creativity; job design; job stress

This paper is about using work design to improve the creativity of professional workers. The Hackman et al. (1975) original model of work design, i.e., the job characteristics model, was designed primarily to improve the work output of blue-collar employees by making their work tasks more interesting, challenging, and intrinsically motivating. The central findings of this original job-enrichment model have since migrated to the design of work at all levels of the organization. Such concepts as the high-involvement organization (Spreitzer 1996) or Theory Z (Ouchi 1981), for example, apply many of the same principles of job enrichment to professional work. Managers now design white-collar work tasks to appear more meaningful and significant to the organization in order to extract even more mindful performance from designers, engineers, and other professionals (O'Reilly 1989).

However, despite more than 30 years of research on work design, there are still some areas of work output that are obviously lacking. In particular, management scholars and practitioners alike continue to lament the lack of creative output by professionals (Sutton 2002). As Ray Bingham, CEO of electronics firm Cadence Design Systems, Inc., recently noted, "The biggest threat to the U.S. economy is lack of creativity.... It's really a question of innovate—or die" (Bingham 2001, p. 24). Similarly, management guru Deborah House recently wrote that lack of innovation is one of the top five *profit drains* that threaten modern corporations, and added that creativity and innovation are even more crucial in today's economy because, "no matter how stable an industry is, today it's changing at least 10 times faster than 25 years ago" (House 2003, p. 34).

A further look into accounts of current-day professional work suggests that one reason for this lack of creative output is that increases in workload pressures (i.e., time and quality pressures) have undermined the effectiveness of traditional models of professional work design. A corporate focus on improving shareholder value through downsizing, for example, has forced many enriched professionals to simply do more work in less time with fewer resources (Ciulla 2000, Fraser 2001). In addition, the introduction of new information technologies (i.e., broadband networks, wireless computers, pagers, and mobile phones) allow supervisors to demand work updates or request project changes at a moment's notice, and expect that employees will provide instantaneous feedback on their progress (Fraser 2001). Furthermore, while advanced technologies are promoted as a means to improve the effectiveness of professional workers, the cognitive strain such advances place on these workers has created new forms of thoughtful labor (Shulman and Olex 1985) and extended work days (Hoschchild 1997). Finally, the busy, stressful, and significant nature of professional work has become an important signifier of status in many organizations (Amabile and Conti 1999). For example, Fraser (2001, p. 22) reports that the car manufacturer Lexus ran advertisements that affirmed their high-workload pressures by

boasting, "Sure we take vacations. They're called lunch-breaks," and "We don't have a company softball team. It would lower productivity by 0.56%."

The end result of these extreme and often chronic workload pressures is that professional work that is designed to be challenging and intrinsically motivating becomes, instead, relentlessly mindful and stress inducing (Fraser 2001, Amabile et al. 2002). Given these challenges, our goals in this paper are to (1) explore why traditional models of work design have not been effective in supporting creative output in contexts of high-workload pressure and (2) suggest an alternative model for improving professional creativity in these contexts. To address these questions, we first need to explicate what we currently know about enhancing professional creativity through work design.

Creativity and the Design of Professional Work

Creativity may be defined as "the production, conceptualization, or development of novel and useful ideas, processes, or procedures" (Shalley et al. 2000, p. 215). Given the importance of creativity to professional work, numerous studies have examined how the design of organizational work contexts might affect the creative output of managers, engineers, designers, and the like. Recent extensive reviews of this research by Zhou and Shalley (2003), Shalley et al. (2004), and Egan (2005) come to the general conclusion that work environments that enhance intrinsic motivation increase creative output, whereas those that hamper intrinsic motivation decrease creative output.

Work Contexts That Increase Professional Creativity

Zhou and Shalley (2003) outline some of the specific dimensions of work environments that have been shown to enhance intrinsic motivation and thus increase creativity among professionals. These dimensions include, among others, complex and challenging jobs (Hatcher et al. 1989), the presence of creativity goals (Carson and Carson 1993), and developmental (versus controlling) feedback and evaluation (Zhou and Oldham 2001). Amabile et al. (1996) refer to these types of factors as environmental stimulants to creativity, and have included them in a scale that measures the climate for creativity in organizations.

A careful look at these environmental stimulants of creativity reveals that they parallel many of the core job dimensions in the original job characteristics model of job design by Hackman et al. (1975)—a model that was also designed to improve the intrinsic motivation of work. For example, "decision-making freedom" in the Amabile et al. (1996, p. 1166) model is equivalent to "autonomy" in the Hackman et al. (1975, p. 58) model;

"challenging work" or "a sense of having to work hard on challenging tasks and important projects" in the Amabile et al. model is equivalent to the Hackman et al. definition of "task significance"; and "sufficient resources, including information" in the Amabile et al. model is equivalent to "feedback" in the Hackman et al. model.

A number of field studies show how these basic job dimensions or stimulants of creativity have been applied in real-world work contexts and where, in practice, they have made real improvements in the creative output of professionals. For example, Amabile et al. (1996, p. 1166) found that work defined as challenging (i.e., "a sense of having to work hard on challenging tasks and important projects"), and work defined as providing freedom (i.e., "freedom to decide how I am going to carry out my projects") was more strongly associated with high versus low creativity projects by managers in a diversified electronics firm (Amabile et al. 1996, p. 1166). Similarly, in a study of white-collar workers in a heavy equipment manufacturing organization, Zhou and George (2001) found that high (versus low) levels of useful feedback from coworkers increased creativity among professionals who were satisfied with their work, whereas Oldham and Cummings (1996) found that increased work complexity led engineers, designers, and drafters to receive higher ratings of creativity from their supervisors. Finally, in a study of administrative employees in knowledge-intensive professions, Dorenbosch et al. (2005) found that professionals whose work involved a variety of skills and bases of expertise were more likely to engage in creativity-oriented behaviors (i.e., they were more likely to generate ideas to improve services and generate new solutions to old problems) than those whose work was more routine.

Work Contexts That Decrease Professional Creativity

Whereas contextual factors such as challenging work and autonomy have been shown to enhance intrinsic motivation and creativity among professional workers, Zhou and Shalley (2003) report that other environmental or contextual factors may hamper these outcomes. In particular, work contexts involving chronically high-workload pressures have been shown to be particularly harmful to professional creativity (Amabile et al. 1996). Chronically high-workload pressures occur in work environments that routinely involve mindful and cognitively challenging tasks, have high-time pressures for completion of those tasks, include frequent interruptions as multiple tasks intrude on each other, and involve attenuated control over the timing, pacing, and quality of work output as supervisors attempt to manage time deficiencies by imposing deadlines or rearranging project schedules. These high-workload contexts would qualify as both high in job demand and low in job control, as

defined by models of job strain (Karasek 1979, Karasek and Theorell 1990).

As noted earlier, one consequence of such high-workload pressures is that professional workdays may move from a state of mindful work, which may increase creativity, to a state of relentlessly mindful work, which may actually decrease creativity. In support of this notion, Amabile et al. (2002) found that intense workload and time pressures, as well as frequent work interruptions, led professional workers to be almost half as creative as they would otherwise be (i.e., they report fewer creative ideas over time). Similarly, in their study of downsizing, Amabile and Conti (1999) found that a number of environmental factors, including workload pressures, were significantly increased by downsizing, and in turn, these environmental factors negatively affected self-reported creativity. In another study, Mueller et al. (2001) used daily questionnaires to track variations in time pressures, along with peer and self-evaluations of creativity in a corporate setting. These questionnaires revealed that increased time pressures significantly reduced individual creativity on the day of the perceived time pressure and on the following day. Finally, in a four-year study of product development engineers, Perlow (2001) found that engineers reported low levels of creativity and high levels of stress when time pressures and interruptions were high.

However, unlike research on stimulants to creativity—which, as described above, appears to have led to real improvements in professional worker creativity—research on the obstacles to creativity does not appear to have resulted in similar improvements. On the contrary, recent research suggests that organizations may be beginning to experience long-term underperformance and lack of creativity due to the chronic stresses of intense workload pressures (Hallowell 2005). Psychiatrist Edward Hallowell suggests that chronically overworked employees display signs of attention deficit trait—a state characterized by "distractibility, inner frenzy, and impatience"—that is completely caused by one's environment (compared with attention deficit disorder, which has both genetic and physiological components) and has become an "epidemic" in today's organizations (Hallowell 2005, p. 1). As evidence of this epidemic, a recent survey by the nonprofit organization Families and Work Institute reveals that one-third of respondents feels chronically overworked, one-half had felt overwhelmed at least once in the previous month (Galinsky et al. 2005), and that poor performance and lower creativity may be a direct result of these workload pressures.

Common Remedies for Overcoming Workload Pressures
If work design has helped to support the stimulants of creativity, why hasn't it helped to overcome the obstacles of creativity as well? In particular, why haven't models of work design helped to overcome the negative effects of workload pressure on the creativity of modern professionals? One likely reason is that the most common remedies for overcoming intense workload pressures—i.e., scheduling blocks of free time or creative brainstorming time into the workday—may be difficult to implement effectively.

The Folly of "Free Time." Unstructured free time is often prescribed to both reduce urgency and encourage the cognitive process of reflective thinking or incubation, which is viewed as central to creativity (Russ 1993, Armbruster 1989). In this manner, Schon (1983) defines the creative role of reflection-in-action as oscillating between involvement and detachment—where detachment is supported by time away from the work tasks themselves. Studies have also found that the processes of reflection and incubation are often difficult to achieve because they involve engaging in behaviors that often appear inefficient to observers (e.g., taking free time from work to think and stare out the window). As a result, Staw (1995) suggests that free time may be bad for morale (coworkers may feel as if the creative types are free-riding on their hard work), and there's no guarantee that creative ideas will emerge from any one episode of divergent thinking or incubation.

More importantly, such unstructured time may more likely be abandoned in times of high-workload pressure (Collins and Amabile 1999). For example, in her two-year study of software engineers, Perlow (2001) found that, while scheduled quiet time for engineers was culturally embraced and effective in improving the overall creativity and productivity of the group, this effect eroded over time as the firm's time-sensitive work impinged on engineers' schedules. As Perlow (1999) notes, "for the next month [after the initial introduction of quiet time], ... I noted a marked deterioration in engineers' adherence to quiet time. Many engineers spoke favorably of the study and what they had learned. Yet, quiet time as previously structured began to disintegrate" (p. 124).

Perlow suggests that this deterioration of quiet time occurred because, although managers had changed the norms about the value of respecting coworkers' unstructured free time, they had not changed the compensation structure in the firm, which continued to reward individual deliverables rather than creative output. When time pressures were high, individuals began to interrupt coworkers during quiet time to get help on their own projects. As Perlow (1999) reports, "Additional time gained through altering the work patterns was simply poured back into work on individual deliverables" (p. 127).

The Blind Side of Brainstorming. As a variation on scheduled free time, professionals often attempt to schedule moments of creativity in the form of brainstorming sessions (see Osborn 1957, Mullen et al. 1991, Sutton and Hargadon 1996) which are held in conference rooms, creativity workshops, or at off-site retreats. These moments are intended to remove professionals from the demands of their traditional work environment for a few hours or days in order to focus on generating creative solutions to particular problems.

Several studies raise fundamental questions regarding the productive value of such focused moments, particularly because these studies relate creativity to the ongoing social context of the organization. For example, these formalized moments of creativity involve group activities. Mullen et al. (1991) performed a meta-analysis of the research on brainstorming and found consistent support for the conclusion that groups are less effective at the number and quality of new ideas than are individuals working alone (see also Paulus et al. 1996). Additional research has also placed such formalized creativity sessions within the context of organizational life. Sutton and Hargadon (1996), for example, found that brainstorming sessions within one product development firm, although ostensibly about the generation of new and better ideas, were often used primarily to serve other functions in the organization. For example, these meetings provided an arena for status competitions among designers, and for impressing outsiders with the skills of these professionals. This study suggests that, although such formally scheduled creativity sessions may be useful for the organizations, they are not necessarily effective at generating creative outcomes.

Alternative Paths to Overcoming Obstacles to Creativity

Given the unsatisfactory effects of scheduled free time or brainstorming sessions on creative output by professionals, we suggest two alternative paths to overcoming the obstacle of intense workload pressure on creativity. First, we suggest that models of work design should explicitly consider creativity as an outcome variable, and in turn focus attention on the antecedent conditions that are necessary to achieve this outcome. Second, we suggest that models of work design should explicitly recognize workload pressure as a contextual factor that moderates the links between work design and work outputs. We now discuss these two remedies for overcoming obstacles to creative output.

1. Including Creativity as an Outcome Variable in Models of Work Design

Most existing frameworks of work design do not explicitly recognize creativity as an outcome variable. This omission may be due, at least in part, to the reality that

most blue-collar work, which was the basis for the original theory of job enrichment, does not require or allow a great deal of creativity. This goes for even those blue-collar tasks that have been enriched (e.g., a line worker in a cereal manufacturing plant may be allowed to make decisions about line speed, or make suggestions about packaging materials, but creativity in these decisions is often constrained by equipment and material choices that are beyond these workers' purview).

An important consequence of the exclusion of creativity in models of work design is that these models then exclude important antecedents of creativity, such as the antecedent psychological states defined in the Hackman et al. (1975) job characteristics model. The neglect of these antecedent psychological states means that related obstacles of creativity are not brought to light. For example, there is increasing evidence that the psychological state of positive affect (i.e., the experience of positive emotions such as contentment, happiness, and joy) may improve creativity in a variety of contexts, including problem solving, brainstorming, and artistic work (Isen and Baron 1991, Amabile et al. 2005). In turn, research on job stress has shown that positive affect among workers is diminished by high-workload pressures (Carver and Scheier 1994). Thus, by focusing on the antecedent psychological state of positive affect, the creativity obstacle of workload pressure is highlighted and recognized. Such recognition is the first step in developing work design models that may overcome these obstacles.

2. Including Chronic Workload Pressures as a Contextual Factor in Models of Work Design

A second means of overcoming obstacles to creativity is to explicitly include workload pressures as a contextual factor in models of work design. In the job characteristics model (Hackman et al. 1975), for example, only pay, job security, coworkers, and supervisors are considered as explicit contextual factors that might affect intrinsic motivation, and thus creativity (see also Hackman and Oldham 1980). Similarly, Katerberg et al. (1979) consider satisfaction with pay, coworkers, and supervision as the primary contextual factors affecting their model of job complexity and work design. A possible explanation for the lack of consideration of contextual factors—such as time pressures and interruptions—in models of work design may be the finding that professional workers actually perceive themselves as more productive and creative under high-time pressure, even though actual performance measures show the opposite is true (i.e., they are less productive and creative; see Amabile et al. 2002). Thus, researchers may not see declines in self-reports of creativity in high-time-pressure environments and may not recognize the importance of including workload pressures in their models.

Figure 1   Effects of Chronic Workload Pressures on Work Design: Relentlessly Mindful Work
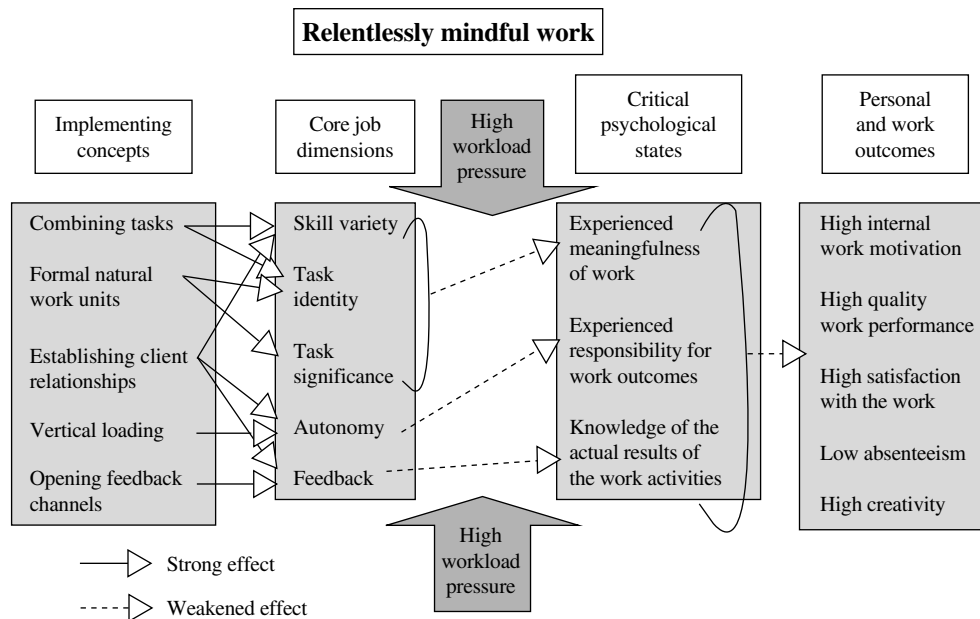
Source. Based on the Hackman et al. (1975) job characteristics model.

However including workload pressure as a contextual factor in models of work design might go a long way toward explaining why work designed to be rewarding and motivating turns into work that is discouraging of creativity (van Yperen and Hagedoorn 2003). Specifically, we suggest that excessive workload pressures may undermine professional workers' abilities to experience positive psychological states that are important for creativity (such as experienced meaningfulness or work) by creating too much demand for core job dimensions (such as skill variety and task significance). These negative effects on work design are illustrated in Figure 1.

For instance, in a high-workload context, the degree of skill variety required of professionals may make it difficult for them to see how all of their work tasks fit together in a meaningful way (e.g., jumping from finegrained data analysis required in one project to broad strategic planning in another may provide competing explanations about the importance of a professional to corporate goals). Second, under conditions of high-workload pressure, task significance may lead to a state of negative self-criticism rather than positive experienced meaningfulness. That is, tasks that are viewed as significant because of high-time pressures may lead to what Gagné and Deci (2005) call introjected regulation—i.e., a motivational state in which one works hard on a task because one's self-worth is perceived to be contingent on task performance—rather than the desired state of intrinsic motivation, in which one works on a task because it is interesting and enjoyable. Employees may feel that keeping up with high-

workload demands is a test of their abilities and self-worth, rather than an inherently interesting thing to do. Finally, while feedback about work tasks may arrive, it may not be processed or examined by professional workers who are under high-workload pressures. In turn, these workers may not experience the critical psychological state of knowledge of the actual results of work (Hackman et al. 1975).

Professional Workday Design Under High Workload Pressure: A Framework Involving Mindless Work

Although traditional models of work design have been increasingly applied to professional work, the above findings suggest that, they have not yet been modified to consider the importance of creativity as an outcome of this work, or the effects of increasing workload pressures on the realization of that outcome. In response, we propose a new framework of workday design. This framework suggests that instead of only focusing on the design of specific tasks (e.g., performance evaluation) or the design of broadly construed jobs (e.g., being a project manager), that work design should also focus on the design of professional workdays—which typically involve work on a variety of specific tasks important to the fulfillment of broad job requirements (e.g., over the course of a workday a project manager may complete a performance evaluation, work on a budget request, and participate in a strategic planning discussion).

Integral to this framework of workday design is the construct of mindless work illustrated in Figure 2. We

Figure 2   The Design of Mindless Work
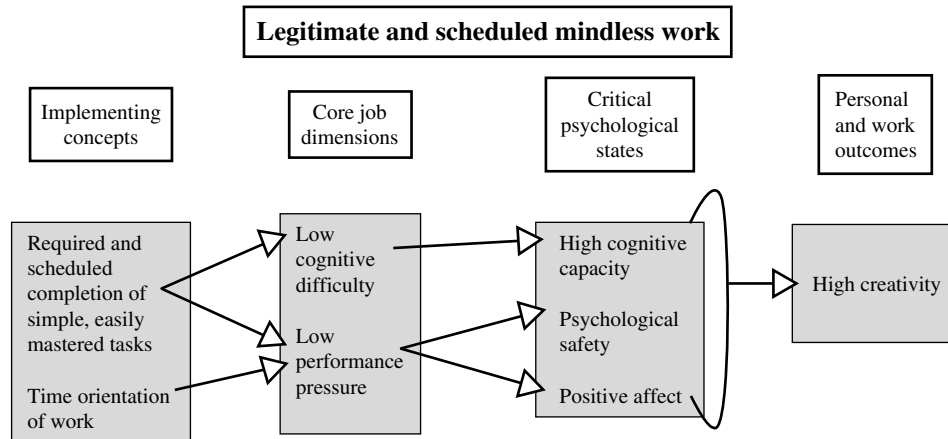
Source. Adapted from the Hackman et al. (1975) job characteristics model.

discuss *mindless work* in more detail below, but define it simply as tasks that are low in cognitive difficulty and performance pressures. Examples of such mindless work include performing simple manufacturing line tasks (e.g., filling supply bins), making photocopies, simple cleaning chores (e.g., cleaning laboratory equipment), performing simple maintenance tasks, sorting or collating tasks, and simple service tasks (e.g., unpacking and stocking supplies).

In our framework of workday design, scheduled bouts of mindless work tasks are inserted between the more cognitively challenging, time-pressured, and interrupted work tasks that make up the bulk of the workers' days. That is, mindless work occurs in sequence with more mindful work over time (imagine a sequencing of Figures 1 and 2). While we do not prescribe specific guidelines for how long and how frequent these bouts of mindless work should be, anecdotal evidence from the popular business press suggests that these bouts should last at least half an hour and occur several times a week, if not daily (Freiberg and Freiberg 1998). We also recognize that these tasks must serve legitimate purposes for those engaging in them: Cleaning one's desk is getting organized, and working on the production line is management by walking around.

Defining Mindless Work
To explicate the construct of "mindless" work in detail, we use the original job characteristics model (Hackman et al. 1975) as a guide. Thus, we discuss critical psychological states of mindless work first, followed by the core job dimensions, and finally the implementing concepts.

1. Critical Psychological States of Mindless Work
Hackman et al. (1975) suggest three critical psychological states that help employees to become intrinsically motivated by their work and perform well: (1) experienced meaningfulness of work, (2) experienced responsibility for outcomes of work, and (3) knowledge of work results. We suggest three additional critical psychological states, shown in Figure 2, that help employees become more creative in their work: (1) positive affect, (2) psychological safety, and (3) high cognitive capacity.

Positive Affect. As noted earlier, a substantial amount of psychological research suggests that positive affect improves creative output among individuals (see Russ 1993 for a review). Early work in this area is dominated by the studies by Alice Isen and her colleagues (Isen and Daubman 1984, Isen et al. 1987, Isen and Baron 1991). These studies have shown that positive affect promotes creative problem solving, unusual word associations, and creative categorization processes (Isen et al. 1985). For example, Isen et al. (1987) found that those in positive (versus negative, or neutral but aroused) mood states were more creative on a word association test and on Duncker's (1945) candle task. Isen and colleagues attribute these findings to "the tendency of persons of positive affect to relate and integrate divergent material, to form new associations, and to recombine mental elements, all of which, according to most current conceptualizations, are involved in creative thinking" (Greene and Noice 1988, p. 895). In support of this notion in organizational contexts, a recent large-scale study of creativity among project-team members (see Amabile et al. 2005) found that positive affect led to peer assessments of employee creativity, and that this effect was due to the increased cognitive variation that resulted from positive affect.

As an alternative explanation for the favorable effects of good moods on creativity, Russ (1993) suggests that positive affect improves creative thinking by allowing individuals to access affect-laden thoughts and memories, and to experience the affect itself. Specifically, Russ suggests that affect-laden primary process thinking (i.e.,

illogical thinking that is drive laden, aggressive, oral, and libidinal) and the creative process are tightly linked. Descriptions of the creative process by writers and artists suggest that the same processes involved in creative thinking (i.e., a dreamlike state, a state of illogical loose associations) are also those identified as affect-laden, primary process thinking (Russ 1993).

Finally, other recent work in this area suggests that positive emotions may improve creativity by expanding the resources upon which people can draw in their creative work. In this manner, Fredrickson's (2001) work on the broaden and build models of positive emotions posits that "[The experience] of positive emotions broadens people's momentary thought-action repertoires, which in turn serves to build their enduring personal resources, ranging from physical and intellectual resources to social and psychological resources" (p. 218). For example, Fredrickson (2001, p. 220) describes how the emotion of joy has been shown to create "the urge to play, push the limits, and be creative" (Ellsworth and Smith 1988, Frijda 1986), whereas the emotion of interest creates "the urge to explore, take in new information and experiences, and expand the self in the process" (Csikszentmihalhyi 1990, Izard 1977, Ryan and Deci 2000, Tomkins 1962). In a framework similar to Fredrickson's, Carver (2003) has developed a model that treats positive feelings as an error signal in a cognitive feedback loop that directs incentive-seeking and threat-avoidance behaviors. In this model, Carver (2003) posits that positive emotions provide a signal that things "are going better than necessary and are presumed to induce coasting" (p. 241). As a result, Carver suggests that positive affect acts as a signal that one can attend to something else, such as creative work.

It is important to note that, by contrast, some recent research suggests that negative affect may positively influence creativity by fostering a perceived need for creative solutions and spurring action to implement such solutions (George and Zhou 2002). However in this research it does not appear that workload pressures are high. Furthermore, it appears that negative mood only enhances creativity in cases in which employees perceive that creativity is recognized and rewarded in their organizations. In these cases, it seems that creativity is a salient focus of employee work and that employees could, if they choose to, easily engage in creative behavior. In sum, it appears that when workload pressures are low, negative affect may be necessary to motivate creative work, but when workload pressures are high, positive affect may be important for allowing creative thought to occur.

Psychological Safety and Creativity. Second, research on psychological safety suggests that feeling that one may be oneself without fear of image threats may motivate workers to freely engage in innovative and playful behavior at work. In this manner, Kahn (1990) found that for summer camp counselors and for members of an architectural firm psychological safety was associated with personal engagement in work. Kahn (1990, p. 700) defines personal engagement as expression of one's "preferred self" in task behaviors, and notes that such natural self-expression underlies creativity (Perkins 1981, Kahn 1989).

Further work on psychological safety has shown that individuals are more willing to take risks in learning new skills when they feel that relevant others will not shun them for mistakes. For example, in studies of children and creativity, researchers have found that creating an environment that helped children feel accepted and emotionally safe, and an absence of appraisal enhanced their creativity and intellectual development (Yakovleva 1994). Similarly, in an organizational context, Edmondson (1999) found that manufacturing team members' perceptions of psychological safety were associated with positive team learning behaviors (i.e., seeking or giving feedback, making changes or improvements, obtaining or providing expertise, experimenting, and engaging in constructive conflict). In turn, these types of learning behaviors have been shown to be central to engaging in creative tasks in organizations (Amabile 1995).

High Cognitive Capacity. A third psychological state that appears to be important for creative thinking is high cognitive capacity, sometimes referred to as high working memory or high attention capacity. In general, psychologists and psychiatrists have found that as cognitive capacity declines, the brain's ability "to solve problems flexibly and creatively declines, and the number of mistakes increases" (Hallowell 2005, p. 3). The reason cited is an overload of processing capacity of the frontal lobes of the brain—the parts of the brain that govern executive functioning such as decision making, planning, and prioritization (Hallowell 2005). If the frontal lobes become overwhelmed by too much information, the brain goes into a sort of survival model, in which the lower brain—the part of the brain that responds to fear and panic in survival situations—takes over control of executive functions. In such situations, Hallowell (2005) suggests that "the manager makes impulsive judgments, angrily rushing to bring closure to whatever matter is at hand. He feels compelled to get the problem under control immediately, to extinguish the perceived danger lest it destroy him . . . . He loses his creativity and his ability to change plans" (p. 4).

By contrast, researchers have found that increased levels of cognitive capacity may improve creative thinking. Psychological research in the areas of cognitive load (van Merrienboer and Sweller 2005), and cognitive busyness (Gilbert and Hixon 1991), for example, provides evidence that high levels of cognitive capacity may

improve problem solving of novel tasks and comprehensive thinking during problem evaluation. To the extent that creative thinking requires such processes (i.e., novel problem-solving abilities and comprehensive thinking), this research suggests that high cognitive capacity might also increase creative output.

Research on cognitive load and learning, for example, has shown that working memory may be limited by increases in intrinsic cognitive load (i.e., cognitive load imposed by the intrinsic nature of information presented, such as its complexity), extrinsic cognitive load (i.e., cognitive load imposed by the way that information is presented, such as its order), or both (van Merrienboer and Sweller 2005). In turn, learning novel and complex new tasks or skills is hindered by increases in both of these forms of cognitive load. In support of these notions, Kester et al. (2001, 2005) have shown that working memory becomes limited when learning new skills (i.e., troubleshooting electrical circuits) requires that individuals learn both a complex concept (e.g., an understanding of how electrical circuits work) and a complex process to carry out the skill (i.e., the sequence of steps necessary for electrical circuit troubleshooting). If information about both of these factors is presented simultaneously, learning is hampered; if these learning tasks are carried out sequentially, learning is improved. Thus, both the intrinsic nature of the learning task (i.e., the complexity of electrical circuits) and the way that information about the task is presented (sequentially or simultaneously) affect the available working memory of learners and, in turn, affect their ability to understand the task. In the same manner, creative problem solving in high-workload professional work contexts may involve both complex concepts and complex processes, about which information may be presented in a rushed, simultaneous manner. As a result, it seems likely that creative problem solving, similar to troubleshooting, would be hindered.

In the same vein, research on cognitive busyness and categorization processes suggests that reduced cognitive capacity may lead individuals to engage in narrowed or stereotypical thinking. For example, Gilbert and Hixon (1991) found that individuals who activated racial stereotypes (i.e., the terms "shy," "short," "rice," "polite," and "nip" activated in the presence of an Asian woman), were more likely to apply those stereotypes to a later evaluation of a person belonging to that race if they were cognitively busy during the evaluation stage than if they were not cognitively busy. In a related study, Gilbert et al. (1988) found that individuals who were cognitively busy were less likely than those who were not to consider situational constraints (i.e., environmental factors that cause behaviors) when making judgments of others. Results of these studies suggest that decreased cognitive capacity hinders individuals' abilities to think comprehensively about an issue, and increases the likelihood that they will rely on simple and even stereotypical

schemas in their person evaluations. In the same manner, cognitive busyness might be predicted to increase the likelihood that individuals will rely on simple, well-worn, and stereotypical thinking when evaluating problems that require creative thinking.

2. Core Job Dimensions of Mindless Work

Hackman et al. (1975, p. 59) define core job dimensions as the "key to objectively measuring jobs and to changing them so that they have high potential to motivate people who do them." They propose that the core job dimensions of skill variety, task identity, task significance, autonomy, and feedback help workers achieve the critical psychological states required for high motivation and productivity (i.e., experienced meaningfulness of work, experienced responsibility for work, and knowledge of the actual results of work). In terms of our model of mindless work, we define two additional core job dimensions (shown in Figure 2) that enable workers to achieve the three critical psychological states of high attention capacity, psychological safety, and positive affect. These core job dimensions are low cognitive difficulty, and low performance pressure.

Low Cognitive Difficulty. Tasks that are low in cognitive difficulty may be completed with little cognitive effort or attention, leaving ample brainpower for thinking about other things (though that thinking could be related to other work that one performs). It is important to note that we do not equate tasks that are low in cognitive difficulty with tasks that are boring but difficult. For example, these tasks are not the work of factory floors that Roy (1960) describes in his famous treatise "'Banana Time': Job Satisfaction and Informal Interaction." These factory tasks, although boring, required concerted cognitive attention (a daydreaming machinist could easily lose a machine part or a body part to the stamper, saw, or stitcher). It is also important to note that low cognitive difficulty tasks are not the same as leisure (Neulinger 1981), i.e., they are not activities that are done for pure enjoyment and that serve no other productive purpose. Low cognitive difficulty tasks are easy but scheduled work, not simply breaks from difficult work tasks. As a result, tasks that are low in cognitive difficulty do not require that workers come up with creative ideas on the spot. Instead they provide the attention capacity that allows creative thinking to be an unexpected by-product of work. That is, they let creativity happen, rather than force it to be done.

As depicted in Figure 2, we propose that low cognitive difficulty may enhance professional creativity by supporting the psychological state of high attention capacity. Psychologists have long known about the detrimental effects of extended periods of cognitively taxing tasks that drain attention capacity. In his 1890 work, *The Principles of Psychology*, for example, William James

proposes that prolonged periods working on cognitively difficult tasks may lead individuals to a state of directed attention fatigue (i.e., difficulty focusing on tasks, and feelings of irritability).

In more recent work on environment and behavior, psychologists have examined the means by which one's work environment might facilitate recovery from directed attention fatigue and thus improve one's overall attention capacity (Kaplan and Kaplan 1983). These researchers suggest four characteristics of a work environment that restore cognitive capacity: (1) fascination with the environment that "draws one's attention effortlessly...such as a babbling brook, the stir of leaves, or the chirps of baby birds"; (2) being away from one's routine work, such as taking a "mental break by gazing out the window, or...a walk in the woods"; (3) becoming immersed in an experience outside of one's routine work; and (4) being in an environment that is compatible with one's goal of restoring cognitive capacity "such that directed attention is not needed and is allowed to rest" (p. 78).

Tasks with low cognitive difficulty may allow cognitive restoration and high attention capacity by providing components of the second and fourth of these characteristics. That is, the act of engaging in tasks that are low in cognitive difficulty is compatible with restoring cognitive capacity by allowing for mental breaks away from the cognitively taxing, yet routine, work that professionals engage in a majority of the time (Nickerson 1999, Sternberg 1999).

At the same time, tasks that are low in cognitive difficulty may stimulate more brain function than simply resting. For example, researchers have found that simple rote tasks, such as chewing gum, increase cognitive performance on short-term memory tasks (Wilkinson et al. 2002). Such tasks are suggested to improve heart rate and blood flow to the brain, without taxing cognitive capacity. In addition, research on breakthrough thinking while working on other tasks has shown that engaging in a simple task allows the mind to free itself from an unproductive fixation on a difficult task, thus opening new and more fruitful lines of thinking (Smith 1995). Finally, in research on cognitive overload, researchers have suggested that simple tasks may clear the mind and prevent the brain from entering survival mode (Hallowell 2005). Thus, Hallowell suggests that employees "do an easy rote task, such as resetting the calendar on your watch or writing a memo on a neutral topic" (p. 7) to quiet alarmist messages from the lower brain that interfere with creative thinking. Together, this research highlights the importance of engaging in other, less-taxing tasks (e.g., mindless work)—and not just idle time—as a means to improve creativity (Simon 1966).

Low Performance Pressure. We also argue (as shown in Figure 2) that tasks that are viewed as having low performance pressures may promote the states of psychological safety and positive affect. First, research on objective self-awareness and self-monitoring (the process of checking one's behavior and comparing it to some benchmark or target; Snyder 1987) supports the notion that low performance pressure promotes psychological safety. A focus on the self is likely to occur in situations where personal performance standards are salient (Fiske and Taylor 1991). Such a self-focus can cause considerable distress in cases where people compare themselves to an ideal performance standard and fall short (Steenbarger and Aderman 1979). In the worst cases, it may cause workers to feel guilt, shame, or embarrassment for not performing adequately compared to some real or imagined standard (Leary 1995). By contrast, when the demands of work are not great and performance standards are not salient, people focus more on the environment than on themselves (Lewis 1991).

A second stream of research that supports the link between low performance pressure and psychological safety is work on play in organizations. This work suggests that tasks that are viewed as merely play may encourage creativity by reducing performance pressures. For example, recent research has shown that merely labeling a task as play (versus work) can change individuals' cognitive approach to tasks (Glynn 1994, Tang and Baumeister 1984). In this vein, Glynn (1994) found that labeling a word puzzle exercise as play led participants to attend more to information about the quality of their performances, make more elaborate and image-laden responses, and become more intrinsically motivated than participants who encountered the same task as a work project. The work participants were more interested in the quantity of their performances, made more efficient and goal-directed responses, and appeared more extrinsically motivated.

Finally, there is evidence that low performance pressures may support creativity by inducing positive affect. Considerable research has shown that stress is associated with lower levels of positive affect and higher levels of negative affect (Carver and Scheier 1994). More specifically, researchers have recently found that stress related to work performance may lower levels of positive affect. For example, researchers have found that critical self-perfectionism—a personality trait associated with constant and harsh self-scrutiny and overly critical evaluations of one's own behavior—is associated with lower levels of daily positive affect, in part because it leads to stress over daily events at work (Dunkley et al. 2003). By contrast, other research shows that making favorable (versus unfavorable) social comparisons to professional peers (in terms of their work performance) leads to higher positive and lower negative affect (Buunk et al. 2001). Such favorable comparisons may be more likely under conditions of low performance pressure.

3. Implementing Concepts of Mindless Work

Hackman et al. (1975) call implementing concepts the "specific action steps aimed at improving both the quality of the working experience for the individual and his [or her] work productivity" (p. 60). In their model of job enrichment, these concepts include combining tasks, forming natural work units, establishing client relationships, vertical loading, and opening feedback channels. In our extension, the implementing concepts that improve the creative experience and output of professionals include (1) requiring professionals to perform simple but necessary tasks, and (2) engaging in periodic time-orientations of work. These implementing concepts support the core job characteristics described above.

Required Performance of Simple, Easily Mastered, but Necessary Tasks. The first implementing concept is the requirement that even more qualified professionals be required to perform some simple and easily mastered tasks that are not a typical parts of their work duties, but are nevertheless necessary for effective organizational functioning and will not get done if the professional assigned to them neglects them. An airline executive, for example, might periodically schedule time to help load baggage for an hour, as did Southwest Airlines CEO Herb Kelleher (Freiberg and Freiberg 1998). Similarly, technicians and engineers might schedule time to help with routine maintenance or cleaning chores (e.g., each technician must clean the lab one day a week), or service tasks (e.g., each engineer must check and fill supply cabinets once a week). Because such tasks may be quickly mastered, they do not tax one's cognitive capacities when performed on a periodic basis. As such they support the core job dimension of low cognitive difficulty. Furthermore, such easily mastered tasks support the core job dimension of low performance pressure because almost anyone can do them effectively, and thus there is little status attached to performing them well. These links are depicted in Figure 2.

At the same time, by requiring and scheduling such important but easily mastered tasks, supervisors ensure that these chores become nonnegotiable parts of the professional workday that are unlikely to be neglected. This is because, unlike scheduling free time, scheduling required but simple tasks makes the professional an important part of the functioning organization and adds the norms of responsibility, obligation, and teamwork to the pressures to carry out these tasks when assigned.

Although critical to the effectiveness of mindless work as a conduit for creativity, requiring easily mastered tasks of professionals may be a hard sell for many of today's professionals. Current working norms have resulted in recognition of fire fighting (i.e., the heroic work of professionals who move serially from one crisis to the next) as a marker of high-status professionals. Under such conditions, mindful work tasks often sweep aside the more routine (and mindless) tasks of the workday and week—from individual acts such as cleaning one's desk to more social interactions such as attending weekly staff meetings. However, for mindless work tasks to be effective, both the individual involved and the entire work group must recognize the value of engagement with such work. Although scheduling does not guarantee these tasks will be given their due time, it provides a legitimacy and regularity that reinforces the value of easily mastered work.

Periodic Time Orientation of Work. A second implementing concept for our framework is the notion that professionals should periodically engage in time-oriented (versus task-oriented) work. Specifically, we propose that, periodically, working on the clock (versus on a project) supports the design of work that is low in performance pressures (see Figure 2).

The experience and meaning of work for modern professional workers is centrally defined by their view of it as task oriented versus time oriented. Professionals, by definition, work in a task orientation: They measure their performance based on tasks completed. By contrast, lower-level workers are routinely required to work in a time orientation: They measure their performance by hours on the job. The difference between these two orientations is great and is associated with perceptions of work as high status and desirable (task oriented) or low status and undesirable (time oriented). Furthermore, task-oriented work, in theory, allows workers more control over the timing and pacing of their work than does a time orientation. Ciulla (2000) notes,

> The task versus time orientation of work explains why we experience the work we do at home differently from work we do at [time-oriented jobs]. We don't say "I have to put in six hours of work today [at home]." Instead we say, "I have to do the laundry, clean, mow the lawn, cook dinner," etc. These tasks may take four, six, or eight hours. Some people enjoy puttering around the house. Puttering is engaging at random in a series of tasks, usually fixing, arranging, or making things. We freely engage in puttering and we do so without a sense of time or urgency. (p. 184)

Research suggests that both blue- and white-collar workers prefer to have control over how long they work because it allows them to schedule in free time as desired (Ciulla 2000). In turn, researchers have shown that having such control may result in desirable work outcomes for both employees and their organizations. For example, studies of reduced-load workers (workers who work fewer than average hours and have more flexibility and control over their work schedules) have shown that periodic breaks from work to concentrate on other life goals (e.g., family, hobby, interests) help to increase workers' productivity, creativity, and sense of satisfaction (Buck et al. 2001, Schor 1991).

Despite these findings, reports show that extreme workload pressures may lead to a relentlessly mindful work day, in which there is no real control over how long one works on each task (i.e., professionals work on the task that is the most pressing, until another emergency arises; Ciulla 2000). Organizational researchers have found that contexts that combine high-time pressures for work output with expectations of high quality of work performance may produce a conflict in which employees have to choose between a time or task orientation (Moyle 1995). The stress associated with such contexts has been shown to increase negative affectivity and decrease job satisfaction (Moyle 1995). In these situations, periodically adopting a time orientation of work (e.g., working on a task whose performance is measured by time on the job, rather than quality of output) may actually feel like a break. Instead of having a dozen projects that all demand attention, the professional filling supply bins for an hour would only have that task to attend to, and would not feel pressure to complete additional tasks, or even to complete more than an adequate amount of the task at hand (e.g., more than necessary to meet daily quotas).

In a similar way, Eisenhardt and Brown (1998) describe how using time pacing to schedule the completion of new product development in high-tech firms helps give employees a sense of predictability in their work. Eisenhardt and Brown argue that such predictability provides a sense of control to employees who work in chaotic and fast-paced industries, and may allow them to devote more cognitive resources to creative problem-solving than to time-pressure anxieties. Thus, we suggest that professional workdays that vary between task and time orientation may allow professionals to experience breaks from their chaotic mindful work to allow them to feel a sense of predictability and control, as well as to provide them with the cognitive capacity to work creatively on other problems.

Discussion: New Thinking About Creativity and Work Design in Professional Work

Our framework of workday design (i.e., a sequencing of mindful and mindless work over the course of a workday) is meant to be applied, specifically, to professional work that requires creative thinking. As such, this framework suggests several new ways of thinking about professional work design and creativity. These new directions in thinking include recognizing the role of creativity and its antecedents in work design, and supporting creativity in high-workload contexts by designing the workdays versus the job or tasks of professionals.

The Role of Creativity and Its Antecedents in Models of Work Design

A first implication of our theorizing is to recognize the role of creativity and its antecedents in models of work

design. On the one hand, our framework suggests that the original job characteristics model was probably more supportive of creativity than most gave it credit for. In particular, it appears that this original model was supportive of the psychological states of positive affect and psychological safety through the design of interesting and autonomous work, which in turn supported creativity as an output. On the other hand, our framework also suggests that chronically high-workload contexts may undermine these critical psychological states, and thus weaken the effect of work design on creative output. Both of these findings suggest that including creativity as an explicit outcome in models of work design may be important to understanding the full potential of such models, and to uncovering other key mediating variables (i.e., critical psychological states such as high attention capacity) that enhance creative output.

This implication fits with a small amount of recent research that suggests that there may be important mediating factors that link characteristics of work design (e.g., job autonomy, skill variety) with innovation or creativity in less stressful work settings (Unsworth et al. 2005, Dorenbosch et al. 2005, Ramamoorthy et al. 2005). For example, in a study of 450 Dutch administrative employees, Dorenbosch et al. (2005, p. 133) found that jobs with high skill variety led to increased innovative work behavior (e.g., generating new solutions to old problems or eliminating obstacles in the process of idea implementation). Dorenbosch et al. suggest that this effect is due to the mediating variable of perceived ownership of work problems. That is, high skill variety leads to greater ownership of work problems, and in turn leads to greater innovative work behavior to solve those problems. Similarly, in two other studies, Ramamoorthy et al. (2005) and Unsworth et al. (2005) found that job autonomy was linked to innovative behavior through the mediating variable of requirement or obligation to innovate. These studies suggest that giving workers job autonomy increases their perceived obligation to innovate, and thus, leads them to exhibit more innovative behavior. Together, these studies suggest that a focus on mediating variables (such as psychological states) is important for the effective design of professional work.

Designing Workdays, Not Jobs or Tasks

A second implication of our theorizing is to explicitly recognize how high-workload contexts undermine many of the benefits of job or task design for professionals. Our framework suggests an alternative approach in such contexts: Designing the workday of professionals to alternate between any type of challenging work and bouts of mindless work. This perspective suggests that enhancing professional worker creativity in high-workload contexts requires scholars to look beyond the dimensions of broad jobs or individual tasks (e.g., are they challenging? do they provide feedback?) to the

dimensions of the workday (i.e., is it balanced between mindless and mindful work?). It also suggests that organizations may not need to worry as much about designing tasks that are overly challenging, or entire jobs that have too many challenging dimensions, as they do about designing workdays that are relentlessly mindful.

This is an important distinction. Most research that links work demands to enhanced intrinsic motivation has focused on managing the demands and challenge of broadly defined jobs (van Yperen and Hagedoorn 2003). For example, in their demand-control model of job demands, Karasek and his colleagues (Karasek 1979, Karasek and Theorell 1990) argue that what they call active jobs (i.e., tasks that are demanding but also allow for worker control and autonomy) will both decrease job strain and increase intrinsic motivation. These arguments have been supported by a few empirical studies (Parker and Sprigg 1999, Theorell and Karasek 1996, van Yperen and Hagedoorn 2003).

At the same time, there is evidence that, even in high-demand and low-control jobs, workers may be intrinsically motivated if they can incorporate breaks into their mindful workday by periodically enlisting the help of coworkers. For example, van Yperen and Hagedoorn (2003) found that job-social support (e.g., "I can ask my supervisor for help when things get tough," "I can ask coworkers for help if I need it") was associated with high intrinsic motivation, even for workers who occupied high-demand jobs. It seems reasonable that what these job-social-support items measure, at least in part, is a periodic lessening of the mindful work that is required of workers. Furthermore, these items imply that job-social support comes at intervals (i.e., only periodically, when demands become high), suggesting that periodic breaks from mindful work are being inserted into the workday by employees. Thus, it appears that when workers are given jobs that they cannot design, they may find creative ways to design the flow of their workday to allow for more creativity.

Limitations

Although our framework of workday design illuminates many new dimensions relevant to improving creativity among professional workers, it is not without its limitations. First, it is important to recognize that this model is explicitly intended for application to creative jobs in chronically high-workload contexts. In contexts where creativity is required but workload is not high, the need for mindless work may not be critical, and may not provide great improvements in creative output. In these contexts there may be other variables (such as the requirement or obligation for creativity discussed above) that are more important for creative output than periodic mindless work. Future research may investigate the threshold levels of workload pressure at which mindful work becomes relentlessly mindful, and creative potential declines. Second, as noted earlier, our model does not specify how to schedule mindless work between more mindful tasks. Empirical work may be necessary to determine how long such mindless work tasks should last and how often they should occur. Finally, we acknowledge that the term *mindless work* may not be the best choice for describing a model of workday design to professional workers. Professionals may respond more positively to terms such as *hands-on time* or *recharge time* as descriptors for mindless work that is done on the factory floor or in the office. Clearly, future studies need to address how best to position and present a framework of workday design that includes bouts of mindless work.

Conclusion

Workdays consumed by tasks having low cognitive complexity, little significance, and unchallenging performance expectations are exactly what the job characteristics model and work design were meant to remedy. However, after 30 years of application—and its dissemination into the design of professional work—there may be reasons for recognizing the value of small doses of mindless work in the workdays of professionals. Such mindless tasks, introduced into otherwise chronically overenriched work, may provide critical opportunities for reflection and reinvigoration. The jazz composer Miles Davis was noted for his recognition that the qualities of musical pieces are not captured in the arrangement of the notes, but also in the arrangement of the silences between notes. A similar perspective may apply to understanding work design—by recognizing that the qualities of work performance may hinge not just on the nature of mindful tasks, but also on the nature of the mindless tasks in between.

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