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# Within-Person Variability in Job Performance: A Theoretical Review and Research Agenda

Reeshad S. Dalal
*George Mason University*
Devasheesh P. Bhave
*Singapore Management University*
John Fiset
*Concordia University*

*Although both researchers and practitioners know that an employee's performance varies over time within a job, this within-person performance variability is not well understood and in fact is often treated as error. In the current paper, we first identify the importance of a within-person approach to job performance and then review several extant theories of within-person performance variability that, despite vastly different foci, converge on the contention that job performance is dynamic rather than static. We compare and contrast the theories along several common metrics and thereby facilitate a discussion of commonalities, differences, and theory elaboration. In so doing, we identify important future research questions on within-person performance variability and methodological challenges in addressing these research questions. Finally, we highlight how the conventional practical implications articulated on the basis of a static, between-person perspective on job performance may need to be modified to account for the dynamic, within-person nature of performance.*

**Keywords:** *within-person variability in job performance; theories of within-person performance; dynamic performance; research methods*

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*Authors' Note: The first two authors contributed equally.*

*Corresponding author: Reeshad S. Dalal, George Mason University, 4400 University Drive, Fairfax, VA 22030-4444, USA.*

*E-mail: rdalal@gmu.edu*

The book *One Day in the Life of Ivan Denisovich* (Solzhenitsyn, 1963/2008) is notable not only for its description of life in the Soviet gulag but also for the realization that, even in such a bleak and highly regimented setting, there exists considerable variability in the situations encountered and the levels of success that one might experience in those situations. Indeed, within the strictures of the gulag, the book describes a *good* day ("Almost a happy day"; Solzhenitsyn, 1963/2008: 167), one on which most things go the protagonist's way.

It is probably safe to say that most modern jobs differ in many ways from the gulag. Nonetheless, the tendency to have good and bad days—and more broadly, to experience variability, across time and situations, around one's average level of performance—is also a feature of the modern workplace. Pioneering organizational researchers were well aware of this: Hersey (1932), for instance, observed that fluctuations in mood were related to fluctuations in daily job performance, and Ghiselli and Haire (1960) observed that the validity of employee selection tests did not remain constant across time but rather increased, decreased, and/or exhibited cyclicity. In fact, research suggests that a considerable proportion of the variability in job performance is attributable to within-person rather than between-person sources (e.g., Dalal, Lam, Weiss, Welch, & Hulin, 2009; Day, Sin, & Chen, 2004; Glomb, Bhave, Miner, & Wall, 2011).

Still, the vast preponderance of the almost 25,000 peer-reviewed studies on "job performance" conducted thus far (according to the APA PsycNET database) focuses on identifying good versus bad performers as opposed to good versus bad performance across occasions or situations encountered by a given person. Consequently, in the present review, we aim to bring within-person job performance variability to center stage. We identify the benefits of understanding within-person variability in job performance, define various forms of variability and the various types of job performance across which we examine variability, and review theories that explain this variability. Subsequently, we emphasize theory elaboration and integration as well as the interplay of theory and method, proposing several research questions along the way. We end the paper by discussing the important practical implications associated with a within-person perspective on job performance.

## Benefits of a Within-Person Approach to Job Performance

Acknowledging that performance is dynamic—in other words, that it fluctuates within persons over time—would facilitate considerable advances in our understanding of job performance and its antecedents (see Hofmann, Jacobs, & Gerras, 1992; Sonnentag & Frese, 2012). The relationship between two constructs at the between-person level may differ from the relationship between the analogous constructs at the within-person level in sign, form, and/or size. Moreover, even when this does not occur, within-person investigations are useful because theorizing at the within-person level will frequently provide a more scientific understanding of the *process* underlying the relationship. We now discuss each of these cases in turn.

First, the sign of relationships may differ across the between- and within-person levels. A well-known example involves the effect of exercise on ambulatory blood pressure (Schwartz & Stone, 1998). Blood pressure readings are lower for people who tend to exercise a lot than for those who do not tend to exercise; that is, the relationship at the between-person level is negative. However, blood pressure readings are higher *on occasions when* a person is

exercising than on occasions when he or she is not; that is, the relationship at the within-person level is positive.

Although many more examples of changing signs of relationships across levels exist (e.g., Beckmann, Wood, & Minbashian, 2010; Marceau et al., in press; Nezlek, 2011), one is particularly noteworthy because it is directly relevant to the performance literature and has generated a flurry of debate. We refer to the relationship between self-efficacy and performance. In contrast to between-person cross-sectional results suggesting that self-efficacy is strongly positively related to performance, and in contrast to Bandura's (1997, 2012) influential social cognitive theory that attempts to explain these results, Vancouver's (e.g., Vancouver, 2012; Vancouver, Thompson, & Williams, 2001) within-person theorizing—discussed further at a later stage—controversially suggests that self-efficacy may in various circumstances be related positively, negatively, or not at all to performance, and that the positive efficacy–performance relationship observed in between-person research is in reality largely attributable to performance influencing efficacy rather than efficacy influencing performance. A recent meta-analysis of empirical within-person research (Sitzmann & Yeo, 2013) concluded that after controlling statistically for factors likely to distort the relationship (specifically, the linear trend and the lagged criterion variable), the within-person correlation between self-efficacy and performance is 0.01, whereas the within-person correlation between past performance and self-efficacy is 0.32. These meta-analytic findings lend support to Vancouver's theorizing and suggest that Bandura's influential social cognitive theory may not provide a complete representation of the causal direction or the process/mechanism of the efficacy–performance relationship.

Second, the form of the relationship may differ across the between- and within-person levels. Several examples are generated by research on aging. A major reason for differences in age-related findings across levels involves practice effects that can ameliorate the effect of age. For example, age-related declines in running performance in 200- and 1,500-meter races are less pronounced at the within-person level than at the between-person level (Young, Weir, Starkes, & Medic, 2008). As another example, the continuous age-related declines on success at the Tower of Hanoi puzzle (a cognitive task used to assess planning ability) observed at the between-person level have not been replicated at the within-person level, where no appreciable decline is observed up to age 65, although a decline is observed thereafter (Rönnlund, Lövdén, & Nilsson, 2008). Of interest is that the Tower of Hanoi results persist even after controlling for practice effects.

Third, the size of the relationship may differ across the between- and within-person levels. A prime example of this is the contention that the "happy-productive worker" hypothesis is more likely to be supported empirically at the within-person level of analysis than at the between-person level (Fisher, 2003). In other words, although happy workers may not be much more productive than unhappy workers, a worker may be much more productive *on occasions when* he or she is happy than on occasions when he or she is unhappy. The within-person happiness–productivity relationships obtained by Fisher (uncorrected mood–performance, $r = 0.41$; uncorrected satisfaction–performance, $r = 0.57$) were indeed stronger than not only the between-person relationships obtained in the same study (all four uncorrected satisfaction–performance $r$s $\leq 0.10$) but also the meta-analytic between-person satisfaction–performance relationship (uncorrected $r = 0.18$; Judge, Thoresen, Bono, & Patton, 2001).[1]

Fourth, and perhaps most importantly, within-person theorizing frequently provides insights beyond those provided by between-person theorizing. When empirical results differ across levels of analysis, within-person theorizing can often supply an explanation. Here, we elaborate upon one of the examples we provided previously. Compared to traditional social cognitive theory (Bandura, 1997), within-person theorizing by Vancouver (e.g., Vancouver, 2012; Vancouver et al., 2001) provides a more nuanced explanation for the negligible within-person meta-analytic relationship between self-efficacy and task performance (see Sitzmann & Yeo, 2013). Both Vancouver's theory and Bandura's social cognitive theory agree that the *indirect* effect of self-efficacy on performance (via goals) is positive. However, the theories differ regarding the *direct* effect of self-efficacy on performance. Social cognitive theory predicts a strong positive relationship, but Vancouver's theory predicts a null, and in some cases, even negative, relationship. According to Vancouver, this is because a person may use self-efficacy to (a) inappropriately interpret ambiguous feedback as well as augment minimal or slow feedback regarding actual performance, (b) incorrectly judge the amount of desired performance, and consequently (c) incorrectly estimate discrepancies between actual and desired performance. Thus, by incorporating descriptions of within-person processes and delineating within-person relationships, Vancouver's theory enriches Bandura's social cognitive theory.

It is, however, important to note that within-person theorizing is frequently richer than between-person theorizing even when empirical results do not differ across levels of analysis. Indeed, many, perhaps even most, research questions in psychology and micro-organizational behavior are in reality within-person questions (Curran & Bauer, 2011; see also Beckmann et al., 2010). Yet, these questions are all-too-frequently tested at the between-person level—and these between-person tests exert a stultifying effect on theory. For example, research questions pertaining to organizational justice are more appropriately posed at a within-person level, in the form of cognitive, affective, and ultimately, behavioral responses to discrete events experienced by a given person over time. Such a perspective would view injustice through the lens of an appraisal of the event, thereby requiring theoretical explanations regarding the conditions under which a person is more likely to view an event as unjust (see Rupp, Bashshur, & Liao, 2007). Such a perspective would also provide a central role to affect and how it fluctuates within a person over time in response to events appraised as just or unjust—something that has been repeatedly advocated but that is nonetheless typically omitted from between-person theories of justice (e.g., Dalal & Hulin, 2008). Similarly, another widely debated research question—the relationship between organizational citizenship behavior and counterproductive work behavior—has typically been studied at the between-person level of analysis even though at heart, it is a within-person question; namely, is "a given person . . . capable of engaging in both [citizenship] and [counterproductive behavior] simultaneously or even within a very small time interval?" (Dalal, 2005: 1251). Although subsequent experience sampling research has confirmed that the relationship between these two types of behavior is similar at both levels of analysis, this research has also demonstrated the need to augment the between-person nomological network with more proximal within-person predictors (Dalal et al., 2009). Thus, differences in relationships across levels of analysis can provide the impetus for theory generation and refinement—but so can similarities (Chen, Bliese, & Mathieu, 2005). Within-person thinking is as important for scientific progress in the case of similarities across levels as it is in the case of differences.

Finally, within-person research addresses important practical concerns regarding the maximization of job performance. Because we discuss practical implications at some length in a

subsequent section of the paper, here we present only one example of the perils of neglecting within-person performance variability. Organizations prefer to hire experienced employees, and between-person research has shown that more experience, at least up to a point, is indeed associated with higher performance (Schmidt & Hunter, 1998). However, within-person research suggests that the impact of experience on performance is more complex than previously believed. For example, Deadrick, Bennett, and Russell (1997) demonstrated that although prior experience was in fact associated with higher performance for sewing machine operators during their 1st week on the job, it was also associated with a slower rate of improvement over 24 weeks of employment. The utility of hiring sewing machine operators on the basis of prior experience will therefore vary greatly as a function of the time frame of interest to the organization.

If within-person performance variability is so important, what are the primary theories that seek to explain the phenomenon? Prior to addressing this question, it is necessary to define what we mean by job performance and within-person job performance variability as well as to delineate between various forms of within-person performance variability and various types of job performance in which we might study within-person variability.

## *Defining Variability and Performance*

We adopt a common definition of job performance: employee behavior that is important to achieve the organization's goals (Campbell, 1990). Early research conceptualized within-person performance variability in terms of changes in the rank-ordering of employee performance scores over time, changes in the validities of predictor variables over time, and changes in the average level of group performance over time (Sturman, 2007). However, it is now understood that these conceptualizations, though important, are the defining characteristics not of within-person performance variability but rather of its between-person manifestations (Sturman, 2007). We therefore define within-person performance variability simply as the change in an employee's performance level over time.

We moreover distinguish between different forms of within-person variability (Beal & Ghandour, 2011; Ployhart & Vandenberg, 2010). One such form involves linear or nonlinear trends or "growth" curves—which can refer to either growth or decline—associated with learning, development, and aging. A second form of variability involves cycles, which are approximately sinusoidal functions containing recurring peaks and troughs. A third form of variability is event driven and therefore discontinuous, leading to sudden changes in direction (forming nonrecurring peaks or troughs) and/or magnitude.

We can, in addition, distinguish between variability associated with "more or less permanent changes in the organism" and variability associated with "more or less reversible changes" (Nesselroade, 2004: 44) as well as between variability that occurs over different time frames (ranging from milliseconds to years; Lord, Diefendorff, Schmidt, & Hall, 2010). The permanence and time frame of variability are often conflated, in part because change can be defined as permanent only if it does not reverse over the medium to long term. For example, job performance trajectories should ideally be examined over several years (long term) to examine whether performance that initially improved continues to improve (nonreversible), stabilizes (also nonreversible), or begins to decline (reversible). In other words, permanent change refers to long-term trends or "growth" curves as well as to discontinuities,

attributable to major life or work events, that alter the magnitude but not the direction of change. Reversible change, however, can occur over the short or long term. For example, as we will subsequently discuss in more detail, mood cycles—which represent reversible change in mood and therefore performance—are likely to occur simultaneously over the course of a day (relatively short term) and over the course of a year (long term). Reversible change can also take the form of discontinuities, attributable to major or minor events (the latter frequently referred to as "daily hassles and uplifts"; Kanner, Coyne, Schaefer, & Lazarus, 1981), that alter the direction of change—thereby resulting in trends interspersed with peaks and troughs. The theories we subsequently summarize differ in terms of the forms, permanence, and time frames of within-person performance variability.

We are interested in within-person variability in overall job performance as well as in several more specific types of job performance, for example, task performance ("[behavior] that [contributes] to the production of a good or the provision of a service"; Rotundo & Sackett, 2002: 67), organizational citizenship behavior ("behavior that contributes to the goals of the organization by contributing to its social and psychological environment"; Rotundo & Sackett, 2002: 68-69), counterproductive work behavior ("voluntary behavior that harms" or is intended to harm "the well-being of the organization" and/or its stakeholders; Rotundo & Sackett, 2002: 69; see also Spector et al., 2006), proactive behavior ("anticipatory action that employees take to impact themselves and/or their environments"; Grant & Ashford, 2008: 8), creative behavior ("the production of novel, useful ideas or problem solutions"; Amabile, Barsade, Mueller, & Staw, 2005: 368), and adaptive performance (behavior such as "dealing with uncertain or unpredictable work situations," "learning new tasks, technologies, and procedures," and "handling emergencies or crisis situations"; Pulakos et al., 2002: 301).

Empirical research suggests the existence of considerable within-person variability in virtually all these forms of performance. In a preliminary analysis of 36 independent samples from experience sampling studies, multi-wave field studies in the workplace or classroom, and multi-trial laboratory studies (total number of respondents = 4,785, total number of time points = 66,750), we found that on average, 62% of the variability in task performance was attributable to within-person sources. Within-person variability in other forms of job performance has been studied less often, but here, too, our review of the available evidence suggests considerable within-person performance variability: organizational citizenship behavior (43%), counterproductive work behavior (49%), proactive behavior (39%), creative behavior (50%), and overall job performance (64%).

The precise percentage of variability attributable to within-person sources is likely to differ across types of performance but also to differ as a function of methodological choices made by researchers (Dalal & Hulin, 2008). In a subsequent section of the paper, we discuss some of these methodological choices and their potential effects on the extent of observed within-person performance variability. For the moment, however, we note that the estimates of within-person variability obtained for all major types of job performance are sufficiently sizable that researchers would be well advised to treat within-person performance variability as meaningful rather than error. We also foreshadow our subsequent discussion by noting that there is a dearth of theories seeking to explain within-person variability in some of these types of job performance (e.g., proactive behavior; Fay & Sonnentag, 2010). Subsequent to our review of the theories, we discuss the extent to which they can be extended to the prediction of additional types of performance.

## Major Theories of Within-Person Performance Variability

Having explained why a within-person perspective on job performance is helpful and what we mean by such a perspective, we now move on to a review of theories that purport to explain variability in within-person performance. In a subsequent section of the paper, we will compare the theories along several metrics that facilitate theory elaboration and integration. In the current section, we have opted for a selective review that focuses on what we regard as the major theories rather than an exhaustive review of theories. In deciding which theories to review, we began with an initial list of theories we viewed as influential in shaping researchers' views of within-person performance variability. We then enhanced this list through an examination of experience sampling studies of job performance in field settings, multi-trial studies of performance in laboratory settings, and other—typically longer-term—within-person field studies conducted in work or classroom settings.

We categorize these theories into three broad clusters, based on the antecedent(s) of performance emphasized by the theories: (a) theories emphasizing the role of ability (and knowledge and skill), (b) theories emphasizing the role of both ability and motivation, and (c) theories emphasizing the role of motivation. Our categorization follows classic formulations to the effect that performance is a function of ability and motivation, with ability representing the capacity to perform and motivation representing the willingness to perform (Blumberg & Pringle, 1982; Campbell, 1990). Our categorization is also roughly chronological and roughly aligns with the evolution of within-person theorizing, such that theories emphasizing motivation are both more recent and more steeped in within-person thinking than theories emphasizing ability.

### *Theories Emphasizing Ability: The Changing-Task and Changing-Person Models, and Extensions Thereof*

The changing-task model defines the "task structure" in terms of the abilities required for performance on the task (Alvares & Hulin, 1972). With increasing practice, the task structure "changes" in the sense that the specific set of abilities *required* to perform the task changes (Alvares & Hulin, 1972; Sturman, 2007). For example, Fleishman (1966) speculated that as practice on tasks, such as a rudder control test and a two-hand coordination task, increases, general "nonmotor" abilities (e.g., verbal ability) will become less important relative to task-specific abilities and motor abilities. As the abilities required by the job change, so does the employee's performance and especially the rank-order of employees in terms of their job performance. The changing-person (or subject) model, in contrast, posits that with increasing practice on the task, scores on the task-relevant abilities *possessed* by the employee change over time (Alvares & Hulin, 1972; Sturman, 2007). Abilities can be "learned, overlearned, forgotten, enhanced by practice on related tasks, and even suppressed" (Alvares & Hulin, 1972: 305). As the abilities possessed by the employee change, so does the employee's performance.

An extension of the changing-task model—albeit while incorporating elements of the changing-person model as well—is Murphy's (1989) stage model of performance. According to Murphy, the relevant antecedents to job performance change over time because the situational characteristics of jobs change over time. According to Murphy (see also Thoresen, Bradley, Bliese, & Thoresen, 2004, for an empirical example), these changes occur in two

specific stages: transition (when employees are new to the job or when their job responsibilities change substantially) and maintenance (when employees are able to perform the primary aspects of the job with little effort). Moreover, according to Murphy, the antecedents of performance differ across the transition and maintenance stages. During transition stages, employees need to learn different work procedures and cannot rely on their prior work experiences in making decisions; consequently, performance is better predicted by cognitive ability than by personality and other motivational factors. During maintenance stages, on the other hand, employees have already acquired the information needed to comprehend work procedures and the experience necessary to proficiently execute work tasks; consequently, performance is better predicted by personality and other motivational factors than by cognitive ability. Murphy furthermore argued that the duration of transition and maintenance stages is contingent on employee characteristics (e.g., cognitive ability, personality) and the type of job (e.g., assembly line jobs will have shorter and fewer transition stages than managerial jobs).

Research on adult development and aging (e.g., Baltes, 1997) provides a variant of the changing-person model in that the person's abilities and hence performance change over time as a function of age (as opposed to task tenure/practice). The nature of change differs with the type of ability: fluid ability—"associated with working memory, abstract reasoning, attention, and processing of novel information"—declines after peaking in the early 20s (Kanfer & Ackerman, 2004: 442), whereas crystallized ability—"associated with general knowledge, extent of vocabulary, and verbal comprehension"—increases until approximately the age of 60 and then declines (Kanfer & Ackerman, 2004: 43). Thus, the impact of age on job performance depends on the ability requirements of the job (Kanfer & Ackerman, 2004; Ng & Feldman, 2008): Jobs requiring primarily fluid ability will witness declines in performance with age, whereas those requiring primarily crystallized ability will witness increases in performance until shortly before retirement age.

In closing, we note that an interesting feature of the research in this area is that it displays an almost exclusive focus on employee selection. Even in the changing-task model, work tasks are viewed solely from the lens of the abilities and skills needed to perform them. Consequently, a notable criticism of this research is that it neither facilitates a scientific understanding of work tasks nor offers meaningful advice for practical concerns other than employee selection (Alvares & Hulin, 1972). In a subsequent section, we will discuss situational complexity and "strength" as concepts that help to flesh out the psychological ingredients of work tasks.

### *Theory Emphasizing Both Ability and Motivation: Typical Versus Maximum Performance*

One theory that has been influential in linking ability and motivation emphasizes the distinction between typical performance (what employees "will do") and maximum performance (what employees "can do"; DuBois, Sackett, Zedeck, & Fogli, 1993; Sackett, Zedeck, & Fogli, 1988). Empirical results suggest that measures of typical and maximum performance are only moderately related: Beus and Whitman's (2012) meta-analysis reports a corrected correlation of 0.42 between them. Adopting classic formulations in which job performance is a function of ability and motivation (Blumberg & Pringle, 1982; Campbell,

1990), Sackett et al. (1988; see also Sackett, 2007) argued that ability is the primary determinant of maximum performance because motivation is believed to already be at its peak, whereas both ability and motivation are determinants of typical performance. This argument has received some empirical support (Klehe & Anderson, 2007). Moreover, the theory has important practical implications: Organizations need to decide whether they are primarily interested in typical or maximum performance or both, and they need to formulate selection procedures and interventions accordingly (Beus & Whitman, 2012).

However, in extant research, typical and maximum performance have been assessed using very different sets of tasks. This risks conflating these components of performance with the tasks used to assess them. One way to assess these components of performance using the same universe of tasks while also accentuating the within-person nature of the theory involves employing an experience sampling research design in which performance is assessed repeatedly (Hektner, Schmidt, & Csikszentmihalyi, 2007; Shiffman, Stone, & Hufford, 2008), and conceptualizing typical and maximum performance as the mean and peak levels of performance, respectively (e.g., Barnes & Morgeson, 2007).[2] In other words, although it has not traditionally been presented as such, the theory is at heart a theory of the role of motivation in determining within-person performance variability: It suggests that performance varies across time within persons, that this within-person performance variability is largely attributable to within-person variability in motivation over time, and that what distinguishes typical performance from maximum performance is whether motivation is at its mean level over time or at its maximum level. Such a view lends itself to an examination of other forms of within-person performance variability as well, for example, performance troughs. Even so, such a view is incomplete. Abilities change over time, as described by the changing-person model. Moreover, a job is a collection of a multitude of tasks (Steele-Johnson, Osburn, & Pieper, 2000)—and, as we discuss in more detail subsequently, the criterion-related validity of knowledge and skills is likely to be highly task contingent.

### *Theories Emphasizing Motivation*

Although "motivation" has been studied by numerous researchers under numerous rubrics, two categories of motivational theories stand out for their emphasis on within-person variability in motivation: theories of affect and theories of self-regulation (Mitchell & Daniels, 2003).

*Affective events theory and related theories*. Affective events theory posits two parallel processes, a between-person one and a within-person one, both of which result in various types of behavior (Weiss & Cropanzano, 1996). In the between-person process, behavior (e.g., turnover) is the result of relatively stable cognitive evaluations of the job (e.g., job satisfaction), which in turn is the result of relatively chronic aspects of the exogenous work environment (e.g., characteristic levels of feedback on the job). In the within-person process, by contrast, behavior is the result of temporally volatile work affect, consisting of a dynamic baseline level of affect that is then subjected to further disruptions.

The baseline level of affect is a function of multiple simultaneously occurring cycles of various periodicities (e.g., daily, weekly, seasonal) that are themselves the result of patterns of location and activity, sociocultural factors, and endogenous factors, such as "body clocks"

(Watson, 2000). For example, there exists some evidence for a daily cycle in mood activation, with the timing of the peak varying across people, thereby supporting lay beliefs regarding "morning people" and "evening people" (Watson, 2000). In addition, according to the theory, the baseline level of affect is frequently disrupted by shocks to the system in the form of discrete events occurring at work (e.g., praise from a coworker, spilling coffee all over one's clothes, failing to meet a deadline). Thus, for instance, the within-person process would emphasize *momentary* affective reactions to *specific instances of* injustice or work–family conflict that differentiate between *time points* within a particular job, rather than *relatively stable* cognitive reactions to *relatively chronic* levels of injustice or work–family conflict that differentiate between *jobs*.

Affective events theory was explicitly intended to be a "framework" or simplifying heuristic rather than a complete depiction of event-appraisal-performance pathways. In reality, cognition and affect are not easy to disentangle at any level (including the neurological level; Adolphs & Damasio, 2001). In reality, affective reactions to work situations are by no means solely within-person phenomena (e.g., Watson & Clark, 1999), and cognitive reactions to job characteristics are by no means solely between-person phenomena (e.g., Vancouver & Day, 2005; see also the subsequent discussion of broaden-and-build theory). In reality, turnover (identified by the theory as a cognitively driven behavior) can in some cases be affectively driven (e.g., T. Lee, Mitchell, Holtom, McDaniel, & Hill, 1999); moreover, citizenship and counterproductive behavior (some dimensions of which are identified by the theory as affectively driven behavior) are partly cognitively driven (e.g., Dudley & Cortina, 2008). The deliberate use of these provocative oversimplifications in the theory appears to be designed to counteract the then-prevailing neglect of workplace affect and to emphasize the theory's major propositions: (a) Workplace affect can and does exhibit great variability over time within persons, (b) workplace affect is a powerful antecedent to at least some types of job performance on the job, and consequently, (c) at least some types of job performance are likely to exhibit great variability over time within persons.

The "framework" perspective moreover has the advantage of readily permitting affective events theory to serve as a rubric for other, narrower theories that aid in fleshing out the within-person event-affect-behavior process. One mechanism by which affect influences behavior is described by broaden-and-build theory (Fredrickson, 2003, 2013). Building on older work, broaden-and-build theory posits that negative affect is evolutionarily intended as a specific action tendency that immediately aids in survival when life-threatening events are encountered. For example, anger and fear are believed to activate the tendencies to fight and flee, respectively (which, in organizational research parlance, translate into aggression and withdrawal, respectively—both of which are dimensions of counterproductive work behavior; Dalal et al., 2009). The unique contribution of broaden-and-build theory, however, lies in its treatment of positive affect. Fredrickson (2003, 2013) has contended that in contrast to negative affect, positive affect broadens a person's "momentary thought-action repertoires" by increasing receptivity to new information and enhancing the scope of attention. The broadened mindset engenders action tendencies that collectively and gradually build a person's resources (e.g., intellectual resources, such as creativity; social resources, such as social support), and the resource reservoir in turn can be drawn upon to engage in proactive behavior (Fay & Sonnentag, 2012), creative behavior (Amabile et al., 2005; Bledow, Rosing, & Frese, 2013), and altruistic—or, in organizational research parlance, citizenship—behavior

(Fredrickson, 2003). Although specific extensions of broaden-and-build theory (e.g., tipping-point positivity ratios) have been found to be in error and have subsequently been disavowed, the core of the theory appears to have received empirical support (Fredrickson, 2013).

A second mechanism through which affect influences behavior requires the assumption that people are hedonistic and wish to experience good moods. Thus, people who are already in a good mood wish to maintain their mood, whereas people who are in a bad mood wish to repair their mood (Cialdini, Darby, & Vincent, 1973; Diener, Lucas, & Scollon, 2006). Mood maintenance and repair can occur through behavior such as organizational citizenship behavior and counterproductive work behavior. In line with these ideas, an empirical study (Glomb et al., 2011) found that negative moods were associated with subsequent helping behavior (a dimension of organizational citizenship behavior) and, in turn, subsequent positive mood.

*Adult development and aging*. Previously, we discussed how aging influences cognitive abilities. However, aging is also associated with changes in information processing goals (away from seeking novel information and toward seeking information that facilitates the maintenance of positive rather than negative emotional states), changes in emotions and emotion regulation (a decreased experience of negative emotions and an increased ability to regulate emotions), and, probably as a result of these factors, improvements in job attitudes, such as job satisfaction and organizational commitment (Luchman, Kaplan, & Dalal, 2012; see also Kanfer & Ackerman, 2004). Personality also changes with age: People become more conscientious and emotionally stable until midlife with a subsequent plateau (Roberts, Walton, & Viechtbauer, 2006), and the rates of personality change also differ somewhat across people until about age 50 with a subsequent plateau (Roberts & DelVecchio, 2000). These age-related changes in personality are attributed to feedback and role expectations/demands in work and family situations and to modeling others' behavior as well as observing one's own behavior in novel situations (Roberts, Wood, & Caspi, 2008).

Many of these age-related changes can be interpreted within Baltes's (1997) "metatheory" of selective optimization with compensation. The premise of this theory is that human development is not unilinear: Both gains and losses are likely to occur at every stage of development, although the ratio of gains to losses can and does vary across stages and tends toward mostly losses in very old age. Thus, individuals *select* goals because of time and resource constraints, *optimize* functioning with regard to those goals, and *compensate* for losses or declines in goal-relevant means. With increasing age comes an increasing magnitude of losses in goal-relevant means, and therefore—in order to sustain satisfactory functioning and facilitate the possibility of continued gains in certain areas—an increasing emphasis on the careful selection of goals as well as on compensation for losses in means via the use of other means and/or resources. A famous example used by Baltes is that of the pianist Arthur Rubinstein, who, when asked how he continued to perform at such a high level at the age of 80, responded that in older age, he chose a lesser number of pieces to play during performances (selection), practiced those pieces more frequently (optimization), and offset losses in finger speed by slowing down segments that preceded faster segments so that the latter appeared faster in comparison (compensation).

Insofar as aging has been studied in organizational research, it has been studied almost exclusively in the context of task performance. Yet, the empirical relationship between age and task performance has been shown to be negligible (Hedge, Borman, & Lammlein, 2006;

Ng & Feldman, 2008), which aligns with the nuances articulated in Baltes's (1997) theory. Meanwhile, the relationship between age and other types of performance has been understudied empirically. Arguably, in light of the age-related changes in experienced emotions and the capacity to regulate emotions, aging should have a larger impact on the more affect-driven types of performance identified by affective events theory (Weiss & Cropanzano, 1996), such that, say, organizational citizenship behavior increases and counterproductive work behavior decreases with age. The limited empirical research available (e.g., Ng & Feldman, 2008) generally supports this contention, although age–performance relationships appear to be fairly weak even for these types of performance.

*The strength model of self-control*. In most instances, including those in organizational settings, the regulation of attention, emotions, and behavior requires considerable mental effort or self-control (Baumeister, Vohs, & Tice, 2007; Muraven & Baumeister, 2000).[3] For instance, to perform work tasks, employees need to manage their emotions and focus their attention on fulfilling job requirements as opposed to nonwork activities. Thus, to perform work tasks, employees need to engage in episodes of self-control. Self-control strength is defined as the capacity to modify one's responses so as to better align them with desired standards and long-term goals (Baumeister et al., 2007). Kaplan and Berman (2010: 54) suggest that self-control strength is also the resource necessary for executive functioning activities, such as "planning or decision making, error correction or troubleshooting, unlearned actions and responses, dealing with dangerous or challenging situations, and overcoming strong habitual responses or temptations."

Researchers who study self-control have explained its functioning by drawing an analogy to a muscle (Baumeister, Gailliot, DeWall, & Oaten, 2006; Muraven & Baumeister, 2000). In the same way as a muscle becomes temporarily fatigued when used, engaging in an episode of self-control temporarily depletes self-control strength (Baumeister et al., 2007; Muraven & Baumeister, 2000). Moreover, like muscle strength, self-control strength can be replenished by a respite from use. Respites from work could occur both outside and during work hours (Eden, 2001; Hanisch & Hulin, 1991), and the extent to which replenishment/recovery actually occurs is likely to depend on the employee's activities during the respites (Kaplan & Berman, 2010; Sonnentag, 2012). Finally, just as muscle size (i.e., strength capacity) increases over time with repeated instances of use, self-control strength capacity increases over time with repeated episodes of self-control.

Self-control strength is important in the current context not only because of its within-person variability but also because it is likely to facilitate job performance. Behavior susceptible to self-control strength depletion includes several types of behavior (e.g., procrastination, cheating, aggression, nonviolent crime; De Ridder, Lensvelt-Mulders, Finenayer, Stok, & Baumeister, 2012), that, in organizational research parlance, would be considered counterproductive work behavior. In other cases, types of behavior that have been shown to be susceptible to self-control (e.g., academic performance; Tangney, Baumeister, & Boone, 2004) would, in organizational research parlance, be considered task performance. In fact, the effects of self-control are likely to be very broad, encompassing all types of performance that require the regulation of attention and impulse control (Baumeister et al., 2007).

*Episodic process model*. Beal and colleagues (Beal, Weiss, Barros, & MacDermid, 2005) have proposed an episodic process model of the role of affect on performance that

incorporates several underlying tenets of both affective events theory and the self-control strength model. A key component of their model is the concept of performance episodes, "behavioral segments that are thematically organized around organizationally relevant goals or objectives" (Beal et al., 2005: 1055). Performance episodes allow people to make sense of their lives; these episodes involve the extraction of meaning and structure from the stream of experience described by theories such as affective events theory (Beal & Weiss, 2013).

A performance episode is believed to be effective if the employee's attention is dedicated completely to the work task at hand as opposed to wandering away due to intrusions emanating from nonwork tasks or affective reactions to exogenous events (Beal & Weiss, 2013; Beal et al., 2005). Maintaining attention requires both ability and motivation. Ability to maintain attention is conceptualized in terms of momentary self-control strength, which is depleted by the need to focus continually on the work task. Motivation to maintain attention is conceptualized in terms of "task attentional pull," intrinsic characteristics of the task that make it more interesting and attending to it less effortful (Kaplan & Berman, 2010).

*Negative feedback loops*. An important mechanism in self-regulation is the negative feedback loop, which compares current progress toward a goal to the rate of progress necessary to attain the goal, with a discrepancy resulting in more effort if progress is judged inadequate and less effort if progress is judged more than adequate (Carver & Scheier, 1982). Vancouver's (e.g., Vancouver, 2012; Vancouver et al., 2001) theory of the within-person relationship between self-efficacy and performance (discussed near the beginning of this paper) operates on the principle of a negative feedback loop.

Self-regulation is thought to consist of multiple negative feedback loops that operate simultaneously, albeit across multiple time frames and multiple levels of abstraction (Lord et al., 2010; see also Johnson, Chang, & Lord, 2006). Over the course of years or months, the existing self is compared to possible and desired selves. Over the course of days, hours, or minutes, current progress on achievement tasks is compared to desired progress. Over the course of several seconds, current progress on a specific task behavior (e.g., typing a sentence) is compared to desired progress on that task behavior. Over the course of tens of milliseconds, current progress on a specific component of behavior (e.g., muscle movement) is compared to desired progress on that component of behavior. Many aspects of these self-regulation processes are not yet well understood (Lord et al., 2010).

## Toward Theoretical Elaboration and Integration

The theories we have reviewed vary greatly in several ways, for instance, the type(s) of job performance the theories seek to explain, the antecedents the theories employ to accomplish this, whether within-person variability in performance is an essential component or merely an important implication of the theories, the time frames within which the theories seek to explain within-person performance variability, the forms of performance variability or change described by the theories, and whether the engendered changes in performance predicted by the theories are reversible. The theories we have reviewed are also complex and in need of further development and precision (Sonnentag & Frese, 2012). Additionally, despite the fact that these theories all have important implications for within-person performance variability, the connections underlying theories that belong to a single domain are

relatively unexplored in the extant literature. For instance, selective optimization through compensation (Baltes, 1997), ensuring self-control (Baumeister et al., 2007), and maintaining attention (Beal et al., 2005) all involve the essential control theory processes of identification of standards, monitoring progress vis-à-vis those standards, and engaging in corrective actions if necessary (Baumeister & Heatherton, 1996; Carver & Scheier, 1982).

To facilitate advances in theory, we compare and contrast the theories along several common metrics: the key antecedents and the primary type(s) of job performance, the forms of variability, the time frame of operation, and the reasons underlying this variability (see Table 1). In the few cases where this process uncovers fundamentally contradictory predictions across theories, opportunities for competitive theory testing—"strong inference" (Platt, 1964)—present themselves, thereby facilitating the pruning of falsified theories or portions thereof (Leavitt, Mitchell, & Peterson, 2010). For the most part, however, we focus on "theory elaboration": systematic extensions of individual theories, with the aim of improving their precision and scope (Bernard & Snipes, 1996) as well as their comparability. Comparing the theories of within-person performance variability along several common metrics permits us to suggest several avenues for theory elaboration, which begins the important process of integration across, and competitive testing between, the theories. Doing so also aligns with Ployhart and Vandenberg's (2010) recommendations for achieving more precise theoretical descriptions of within-person relationships.

### *Types of Performance*

In terms of the types of performance implicated, many theories of within-person performance variability focus solely on task performance (see Table 1). We therefore submit that an important avenue for theory elaboration involves expanding these theories to incorporate additional types of performance, especially types of performance other than task performance. We moreover submit that in many cases, the propositions articulated by the theories are readily extendable to one or more other types of job performance without the need to alter fundamental assumptions underlying the theories. To illustrate our point, we provide two examples.

First, consider that the necessity of possessing knowledge, skills, and abilities is not limited to task performance. Intelligence has been shown to relate negatively to counterproductive work behavior, and theoretical explanations for this relationship include the ability to accurately judge the consequences of one's actions, the ability to engage in moral reasoning, and the ability to avoid getting caught when one does engage in counterproductive work behavior (Dilchert, Ones, Davis, & Rostow, 2007). Intelligence has also been shown to relate positively to adaptive performance (Pulakos et al., 2002), and both intelligence and knowledge have been shown to relate positively to proactive behavior (Bindl & Parker, 2010). Similarly, Dudley and Cortina (2008) have identified several skills and types of knowledge relevant to organizational citizenship behavior (e.g., self-insight, behavioral flexibility, emotional knowledge, and emotion perception and management), and many of these appear relevant to other types of performance as well. These findings suggest that some of the more cognitively oriented theories we reviewed are applicable to multiple types of performance. Given that the knowledge, skills, and abilities required by the task can change over time (e.g., after a new performance monitoring system is installed), the changing-task model is

## Table 1
## Theories of Within-Person Performance: Forms of Variability, Time Frames of Operation, and Reasons for Variability

| Theory of Within-Person Performance | Performance Criteria Emphasized | Key Predictors | Summary of Predictions | Forms of Variability | Time Frames of Operation[a] | Reasons for Variability |
|---|---|---|---|---|---|---|
| Changing-task and changing-person model | Task performance | Task-related skills and abilities | Over time, the specific abilities *required* to perform the task change, as do the specific abilities *possessed*. | Trends over time | Task and ability changes occur over the long term. | Changes in tasks and persons occur gradually, with changing task practice. Given that measurements of performance in such studies are typically taken only once every few months, short-term fluctuations are smoothed. |
| Typical and maximum performance | Task performance | Ability, motivation | Typical performance is a function of ability and motivation. Maximum performance is primarily a function of ability. | Peaks (maximum performance); over short time frames, there will be little variation in typical (mean) performance. Over long time frames, there may be trends in typical performance. | Typical performance is assessed over the long term. Maximum performance occurs over the short to medium term. | Peaks represent instances of maximum performance. Over short to medium time frames, average levels of performance, which indicate typical performance, will exhibit minimal variation because there will be minimal variation in employee motivation and ability. Over long time frames, mean levels may show upward or downward trends, based on variation in motivation and ability. |
| Affective events theory | Organizational citizenship behavior and counterproductive work behavior | Affect | Discrete workplace events temporarily disrupt existing affective cycles. Affect in turn influences behavior. | Cycles with various periodicities (e.g., day, week, year); peaks and troughs over short time frames, as existing cycles are disrupted by events | For mild and frequent events, affect changes occur in the short to medium term. For severe and unexpected events, affect changes could occur across all four time frames. | Employees will experience affect cycles of various periodicities, which will translate to performance cycles of similar periodicities. Over the short term, there are likely to be changes (peaks and troughs) in affect due to work events that act as shocks to the baseline "system" of cycles. Changes in affect lead to changes in performance. |
| Broaden-and-build theory | Organizational citizenship, creative, proactive, and counterproductive work behavior | Affect | Negative emotions lead almost instantaneously to counterproductive work behavior, like aggression or withdrawal. Positive emotions increase receptivity to new information, build resource capacity, and are associated with citizenship, creative, and proactive behavior. | Peaks associated with negative emotions; trends associated with positive emotions | Negative emotions change behaviors virtually instantaneously and in the short term. Positive emotions change behaviors over the short to the medium term. | Negative emotions yield peaks in counterproductive work behavior (because behavior spikes in response to perceived immediate threats), whereas positive emotions yield trends in creative, proactive, and citizenship behavior (because performance improves over time). |

*(continued)*

## Table 1 (continued)

| Theory of Within-Person Performance | Performance Criteria Emphasized | Key Predictors | Summary of Predictions | Forms of Variability | Time Frames of Operation[a] | Reasons for Variability |
|---|---|---|---|---|---|---|
| Adult development | Task performance | Ability, personality | Fluid ability declines after peaking in the 20s. Crystallized ability increases up to age 60 and then declines. Conscientiousness and emotional stability increase until midlife with a subsequent plateau. | Trends | Ability and personality changes occur over the long term. | Changes in abilities occur over a period of time. Because these changes differ based on the type of ability (fluid ability versus crystallized ability), over time there can be performance increases or decreases. There are greater fluctuations in personality in early adulthood, with the rate of change in personality stabilizing by midlife. |
| Self-control strength model and episodic process model | Task performance and counterproductive work behavior | Self-control strength, task attentional pull | Engaging in self-control (maintaining attention on the task) depletes resources in the short term (or over the duration of the performance episode) but repeated acts of self-control build self-control strength over the long term. | Short-term trends interspersed with peaks and troughs; also longer-term trends | Self-control depletion will occur in the short to the medium term. Self-control replenishment will occur in the short to the medium term. Self-control capacity changes will occur over the long term. | Downward trends will occur as self-control strength gets depleted. Upward trends will occur as self-control strength gets replenished. Interfaces between downward and upward trends constitute troughs and vice versa for peaks. Over a long time frame, an upward trend will occur if self-control is "exercised" repeatedly; a downward trend will occur if self-control is not exercised repeatedly. |
| Negative feedback loops | Task performance | Affect, cognition | Self-regulation involves negative feedback loops in which current progress toward a goal is compared to the progress necessary to attain the goal. | Short- and medium-term trends (often nonlinear), interspersed with peaks and troughs, associated with discrepancies between current and desired progress | Multiple negative feedback loops are overlaid on each other, ranging from virtually instantaneous loops to long term loops. | Performance increases suddenly when current progress toward a goal falls short of progress necessary to attain the goal. Performance decreases suddenly when current progress toward a goal exceeds progress necessary to attain the goal. |

[a]To put the theories on a common metric, we use the time frames proposed by Lord, Diefendorff, Schmidt, and Hall (2010) to compare the time frames within their own theory. Therefore, long term = months or years; medium term = minutes, hours, days; short term = several seconds; and virtually instantaneous = tens of milliseconds.

applicable. Given that the knowledge and skills possessed by an employee typically change over time, the changing-person model and the models of adult development are applicable.

Second, consider that the efficacy–performance relationship has been conceptualized and empirically tested with regard to task performance. Yet, a construct similar to self-efficacy—perceived capability—has been implicated with regard to proactive behavior (Bindl & Parker, 2010). This presents an opportunity to test whether Vancouver's (Vancouver, 2012; Vancouver, et al., 2001) within-person theory regarding the efficacy-performance relationship, supported by meta-analytic results in the case of task performance (Sitzmann & Yeo, 2013), will also hold when performance is operationalized as proactive behavior (see Table 2 for related questions for future research).

### *Criterion Space*

As stated in the previous section, there is a need for theories to predict within-person variability in types of job performance other than task performance—or, more generally, in all the types of job performance revealed by analyses of the within-person structure of job performance. Unfortunately, however, we currently do not yet have a good understanding of the within-person structure of performance. Models of the structure of performance (e.g., Campbell, 1990) have largely originated at the between-person level and may not adequately generalize to the within-person level (Cervone, 2005; Muthén, 1991). At a theoretical level, some performance constructs may not have the same meaning across levels of analysis. Take for instance, the domain of counterproductive work behavior. As research on interruptions (Tett & George, 2003) suggests, interruptions that would typically be classified as "counterproductive" work behavior (e.g., surfing the web, making personal phone calls, chatting with coworkers around the water cooler, or leaving for home early) may actually vary in the extent to which they are counterproductive: Some interruptions may serve as an occasion for resource replenishment and consequently improvement in the trajectory of task performance. More generally, within-person theorizing reveals that many types of "counterproductive" work behavior may not be harmful to the organization, and may even be beneficial to it, when one considers temporal *sequences* of behavior. For example, an employee who leaves work 15 minutes early on a particular evening (a counterproductive work behavior) may do so only because he or she arrived at work 30 minutes early that morning (an organizational citizenship behavior): In the employee's mind, the two behaviors are connected and the net effect is a 15-minute benefit to the organization. Spector and Fox (2010a, 2010b) provide several additional suggestions regarding how counterproductive work behavior can be temporally intertwined with organizational citizenship behavior, such that the net effect to the organization is not necessarily negative. The within-person perspective to this question, therefore, provides a richness and nuance that goes well beyond that of the between-person perspective.

Moreover, assessing structure is conceptually more difficult at the within-person level than at the between-person level. For example, as alluded to previously, Dalal et al. (2009) concluded that counterproductive work behavior and organizational citizenship behavior are distinct factors at the within-person level because instances of these two dimensions of performance do not co-occur much less or much more than would be expected by chance. However, the previously provided examples (see also Berg, Wrzesniewski, & Dutton, 2010,

**Table 2**
**Theory Elaboration and Integration: Questions for Future Research**

| Research Domain | Illustrative Research Questions |
|---|---|
| Types of performance | • How should a theory that aims to predict within-person variability in one type of performance (e.g., task performance) be extended to other types of performance (e.g., proactive behavior)?<br>• When can such theory elaboration be effected without the need to alter fundamental assumptions underlying the theory?<br>• If it is necessary to alter fundamental assumptions, can these assumptions be altered in such a way that facilitates the prediction of new types of performance without vitiating the prediction of the original type of performance? |
| Criterion space | • What, if any, are the differences between the traditional, between-person factor structure of performance and the within-person factor structure of performance?<br>• What, if any, are the differences between the traditional, between-person factor structure of performance—that is, the factor structure of within-person performance *mean* scores over time—and the between-person factor structure of within-person performance *variability* scores over time? |
| Time frames of operation | • For each theory, what are the durations (tens of milliseconds, several seconds, minutes/hours/days, or months/years) of the time intervals during which the predictor variable's effect on the criterion variable (a) increases, (b) remains in equilibrium, and (c) decreases?<br>• When these theories are extended to emphasize multiple types of performance, is there a legitimate reason to expect a juxtaposition of time frame with type of performance? |
| Forms of variability | • For theories emphasizing relatively permanent change, is the predicted change linear or nonlinear, and if the latter, is it continuous or discontinuous (e.g., due to "Eureka" insights)?<br>• If the predicted change is nonlinear, how much value is added, perhaps in terms of incremental percentage variance explained in criteria, by the nonlinear component of change over and above the more theoretically parsimonious linear component?<br>• For theories emphasizing reversible change, what mathematical forms does the predicted change take (e.g., peaks, troughs, complete cycles)? |
| The work situation | |
| Time or situations | • Can the theory distinguish between within-person performance variability attributable to time versus situations?<br>• In the theory, which situational features covary with time (and vice versa)? |
| The situational unit of analysis | • Is the partitioning of the subjective experience of situations into transition and maintenance stages generalizable across levels of situational units (events, performance episodes, tasks, and job stages)?<br>• Is this partitioning also generalizable to types of performance other than task performance (e.g., adaptive performance, proactive behavior)? |
| The psychological content of situations | • Does situational *complexity* have analogous moderating effects (with abilities/skills, in the prediction of performance) across situational units of analysis (events, performance episodes, tasks, and job stages)?<br>• Does situational *strength* have analogous moderating effects (with all individual differences, including personality and abilities/skills, in the prediction of performance) across situational units of analysis (events, performance episodes, tasks, and job stages)?<br>  • Of most interest, are transition stages of the job perceived as "weaker" situations than maintenance stages? If so, is the effect of (say) personality stronger or weaker in transition stages of the job than in maintenance stages? Similar questions arise for other situational units (i.e., events, work tasks, and performance episodes).<br>• Are direct event-behavior links (as opposed to indirect/mediated event-affect-behavior links) more likely in constraining and consequential situations than in clear and consistent situations?<br>  • Of most interest, is the phenomenon of behavioral compliance despite negative affect more likely in constraining and consequential situations than in clear and consistent situations? |

*(continued)*

**Table 2 (continued)**

| Research Domain | Illustrative Research Questions |
|---|---|
| Predictor space | • To what extent are theoretical expectations regarding high within-person variability in situational complexity and situational strength borne out by empirical results? To what extent are theoretical expectations regarding the *absence* of short- and medium-term within-person variability in cognitive abilities borne out by empirical results?<br>• How—conceptually and empirically—is affect related to self-control strength? How is affect related to behavior: directly or indirectly (i.e., through attention)?<br>• How are knowledge, skills, and abilities deployed toward performance on a given occasion? For example, compared to people who score low on relevant knowledge, skills, and abilities, do people who score high perceive situations as lower in complexity and higher in clarity and consistency (i.e., aspects of situational strength)? |
| Predictor–criterion relationships | • What are the static predictors of various aspects of relatively permanent/nonreversible performance change (i.e., performance intercept, linear performance trend, quadratic performance trend, etc.)?<br>• Are specific forms of variability in performance (e.g., daily cycle) attributable to the corresponding forms of variability in dynamic predictor variables? |
| Reverse causality | • When does it make sense to think of job performance as a predictor rather than a criterion variable? What are the consequences of performance? To what extent are the consequences of performance the same constructs as the antecedents to performance (i.e., reciprocal determinism)? |
| Interplay of theory and method | |
| Reliability | • To what extent is apparent within-person performance variability actually due to the unreliability of performance measures? |
| Validity | • When are methodological choices likely to influence the internal, construct, and external validity of theories of within-person performance variability? |

regarding proactive behavior and adaptive performance) suggest that when assessing structure, it is important to consider not just behavioral co-occurrence but also behavioral sequencing. Moreover, in empirical tests, the careful choice of time intervals to study is important, so as to avoid conflating behavioral co-occurrence with behavioral sequencing. For example, if episodes of counterproductive work behavior and organizational citizenship behavior typically last for 15 minutes apiece, an experience sampling study that asks respondents to subjectively aggregate their behavior across 2-hour intervals cannot distinguish between co-occurrences and sequences. Additional research on performance episodes would therefore be helpful. Although performance episodes can obviously vary in time, theory may nonetheless be able to suggest time frames that would be decidedly too short or too long.

A second important aspect of the criterion space involves the possibility of individual (i.e., between-person) differences in within-person performance variability. This possibility is understandably not discussed in between-person theories of performance, but it is also generally absent from the within-person theories of performance we summarized. Yet, the idea of individual differences in behavior variability has a venerable history (Fiske & Rice, 1955), and in our view, this idea should be applied specifically to job performance variability. Individual differences can exist in within-person performance variability per se (measured, for example, using the standard deviation of performance over time) or in specific types of within-person performance variability (e.g., trends or cycles) that may differ in terms of time frame and/or reversibility. Regardless, these individual differences in performance variability are likely to be functions of dispositional factors (e.g., individual differences in affect

variability; Eid & Diener, 1999) and situational factors (e.g., individual differences in the variability of location and activity; Watson, 2000). Thus, the impact of individual differences in dispositional variability can be isolated only by holding situational variability constant (Fiske & Rice, 1955) or by controlling statistically for it, and vice versa. Researchers could therefore use existing theories of within-person performance to examine dispositional and situational predictors of individual differences in within-person performance variability. However, the study of individual differences in performance variability also includes the possibility of additional novel hypotheses. One particularly interesting research question involves whether individual differences in performance variability are symmetric across time frames, a phenomenon referred to as "ergodicity" (Molenaar, Huizenga, & Nesselroade, 2003). Thus, for example, researchers could examine whether the same employees who are more likely to exhibit a daily performance cycle are also more likely to exhibit an annual performance cycle.

The issue of individual differences in within-person performance variability is related to the aforementioned issue of the factor structure of performance. Previously, we contrasted traditional between-person factor structures to within-person factor structures. However, it is also possible to contrast traditional between-person factor structures—which may be viewed as reflecting the factor structures of within-person *mean* scores over time (Fleeson, 2007)—with the between-person factor structures of within-person *variability* scores over time (e.g., Salthouse, 2012). To take just one example, it remains to be seen whether, in the same way as organizational citizenship behavior has been distinguished empirically from counterproductive work behavior at the between-person level (Dalal, 2005), organizational citizenship behavior *variability* can be distinguished empirically from counterproductive work behavior *variability*. Future research should explore issues such as these (see Table 2).

### *Time Frames of Operation*

In terms of the time frames of operation, different theories and, occasionally, different components of a single theory (e.g., Baumeister et al., 2007; Lord et al., 2010) emphasize within-person variability occurring across different time frames, ranging from tens of milliseconds (e.g., muscle movements relevant to a specific component of behavior in negative feedback loops) to years or decades (e.g., models of adult development)—suggesting that overall within-person performance variability can be decomposed into variability at multiple time frames, overlaid on each other. In Table 1, we have attempted to summarize the time frames encapsulated in each theory. However, to accomplish this, we frequently had to refer to the empirical literature or make educated guesses because the time frame(s) involved for the theories were not sufficiently apparent. By *time frame*, we mean what Zaheer, Albert, and Zaheer (1999) refer to as the "existence interval"—that is, the length of time required for one instance of the phenomenon or episode to take place. More specifically, as Mitchell and James (2001) suggest, theories should precisely articulate the time intervals during which the predictor variable's effect on the criterion variable increases (i.e., the equilibration period), remains in equilibrium (i.e., the equilibrium period), and decreases (i.e., the entropic period). In Table 1, we compare time frames across and within theories by using the time units used by Lord et al. (2010: 548) to summarize various time frames within their own theory: "tens of milliseconds" (virtually instantaneous), "several seconds" (short term), "minutes/hours/days" (medium term), and "months/years" (long-term change) in Table 1.

Table 1 moreover suggests a juxtaposition of time frame with type of performance: Theories that employ longer time frames are also more likely to emphasize task performance. This may suggest that different theories are needed to explain within-person variability in task performance versus other types of performance. Yet, as mentioned previously, many of the theories that currently emphasize task performance could readily be expanded to include multiple types of performance. We therefore believe this juxtaposition to be indicative more of the need for theory elaboration than of any inherent juxtaposition of type of performance with time frame of operation (see Table 2 for related questions for future research).

The more precise articulation of time frames within each theory (i.e., theory elaboration) is likely to provide opportunities to combine and refine the propositions from multiple theories (i.e., theory integration). As a first step, we suggest that researchers look for opportunities to integrate theories that operate at similar time frames. Consider, for example, the changing-person model and theories of ability change as a function of adult development. In Table 1, we speculate that the processes composing both theories operate over the course of several months or years. Moreover, these theories lend themselves to integration because they share certain common elements: According to both theories, changes in task performance over time are a function of changes in abilities over time. However, the theories differ in their interpretation of the distal predictor responsible for changes in performance over time (see also Sturman, 2003): task practice (changing-person model) versus age (adult development perspective). Future research should therefore habitually assess both task practice and age together, so as to determine the relative importance of these two temporally oriented constructs vis-à-vis changes in abilities and hence performance. Task practice has typically been operationalized as job tenure, which is measured in time units and is generally found to correlate highly with age (e.g., $r = 0.51$ in Bedeian, Ferris, & Kacmar, 1992), making it all the more important for future research to disentangle their effects on performance (for an example, see Fu, 2009). However, such research is also useful if task practice is operationalized more directly as the number of times the task has previously been performed (see Quiñones, Ford, & Teachout, 1995).

### *Forms of Variability*

The theories also differ in the forms of performance variability they emphasize (see Table 1). Theories featuring individual differences as predictors (e.g., the changing-person and changing-task models, Murphy's model, adult development model) typically emphasize relatively permanent change (primarily in the form of linear or quadratic trends over time, though, as Keil and Cortina, 2001, have suggested, discontinuous change can also occur as a function of learning through "Eureka" insights). Theories featuring within-person factors as predictors (e.g., affective events theory, self-regulation through negative feedback loops) emphasize reversible change. Some theories emphasize both reversible change and relatively permanent change. For example, self-control strength theory (Baumeister et al., 2007) features the depletion and replenishment of self-control strength, both of which represent reversible change, as well as the development of self-control strength capacity, which represents somewhat more permanent change. Theories that feature reversible change also differ in terms of the mathematical forms taken by this reversible change, although we caution that we frequently had to infer these mathematical forms because they were not explicitly articulated in

the theories. Performance extremities appear to be emphasized in many theories, but entire performance cycles appear to be emphasized less frequently. The emphasis on performance peaks suggests that several of these theories are relevant not merely to typical performance but also to maximum performance (see Table 2 for related questions for future research).

### *The Work Situation*

The work situation exerts a potent influence on job performance (Johns, 2006), and its role needs to be better integrated in the theories of within-person performance variability. For instance, the changing-task model conceptualizes work tasks solely through the lens of the abilities and skills needed to perform them, whereas a scientific understanding of work tasks would require that work tasks be conceptualized in terms of underlying psychological constructs describing work situations (Alvares & Hulin, 1972). Stated differently, although the theories we reviewed followed classic formulations (Campbell, 1990) by featuring ability (i.e., the capacity to perform) and motivation (i.e., the willingness to perform) as key antecedents to performance, these theories would be enriched by more direct accounting of the role of the work situation (i.e., the opportunity to perform; Blumberg & Pringle, 1982). We discuss the role of work situations under three rubrics: distinguishing situations from time points, the situational unit of analysis, and the psychological content of work situations.

*Time or situations*. It is often unclear whether within-person changes in performance should be attributed to time or situations. For example, the environmental component of circadian rhythms in mood activation may be a function of time of day or of situational factors, such as patterns of location and activity (Watson, 2000) and patterns of affective events (Weiss & Cropanzano, 1996) that covary with time of day. Disentangling the effects of time and situations is one of the most vexing problems facing within-person research (Biesanz, West, & Kwok, 2003). Nonetheless, as a start, theories focusing primarily on time should attempt to identify situational factors that covary with time, and vice versa. These theory elaboration efforts and empirical tests thereof should lead to an uncovering of unstated assumptions within theories, which in turn should permit a convergence between time-based and situation-based theories (see Table 2 for related questions for future research).

*The situational unit of analysis*. The theories reviewed previously collectively suggest several candidates for the fundamental within-person unit of analysis for work situations: event, performance episode, task, and job stage (see Table 1). For instance, in their discussion of performance episodes, Beal et al. (2005) also discuss events and tasks. They distinguish performance episodes from tasks by stating that episodes are temporally bounded whereas tasks are not: Employees can return to incomplete tasks at subsequent times. Based on this discussion, it seems reasonable to conclude that events—or at least minor events, such as daily hassles and uplifts (Kanner et al., 1981; see also Beal & Ghandour, 2011)—are nested within performance episodes (although in some cases they may also compose the temporal transitions between performance episodes), which in turn are nested within tasks. Beal et al. do not discuss job stages (e.g., Murphy's [1989] transition and maintenance stages), but due to the much longer time frames involved in job stages, it seems reasonable to further conclude that tasks are nested within job stages.

Different situational units can also be connected in terms of the ways in which effort and strategies are adapted to meet desired states in the face of changing external demands (Lord

et al., 2010). Specifically, performance episodes are likely to consist of stages of the goal process more directly focused on task performance (during which negative feedback loops apply), preceded by other stages that prepare the groundwork for performance through goal setting and planning (Lord et al., 2010). These stages may be especially pronounced when task work is performed in the context of teams (see Marks, Mathieu, & Zaccaro's [2001] distinction between action and transition stages). At longer time frames, a similar distinction can be made between stages of the job characterized by stability and hence focused on performance (maintenance stages) and other stages of the job characterized by change and hence focused on planning and learning (transition stages; Murphy, 1989). In other words, the subjective experience of situations can be partitioned simultaneously into several situational units that may simultaneously be nested within each other and composed of parallel stages of transition and action. These speculations about the subjective partitioning of work situations could be tested empirically via verbal protocol studies (e.g., Walker, 2005) conducted at various situational units of analysis. Moreover, it is important to note that these speculations about subjective partitioning are specific to task performance (i.e., some stages exhibit more within-person task performance variability than others, and the very *meaning* of task performance changes across stages). Arguably, however, a similar subjective partitioning could apply to at least some other types of performance. Adaptive performance, for instance, may be more important in transition stages than in maintenance stages, and the very meaning of proactive behavior may change across stages, for example, being proactive about goal setting during transition stages versus being proactive about goal striving during action stages (see Table 2 for related questions for future research).

*The psychological content of situations*. Although the theories we reviewed had much to say about the situational unit of analysis, they had little to say about the psychological content of situations. One barrier to a psychological understanding of work situations is the lack of a well-developed and widely accepted taxonomy of work situations (Funder, 2006). In the absence of such a taxonomy, we focus our attention on two popular situational characteristics: complexity and "strength." We focus on these situational characteristics not because they were originally conceived with within-person/job variability in mind but because they nonetheless exhibit within-person/job variability, because they are relevant to multiple types of performance (Meyer et al., in press), and because they can aid in the integration of the situational components of theories of within-person/job performance variability.

The first of these characteristics, situational complexity, is frequently defined in terms of information processing demands (Steele-Johnson et al., 2000). Research on job complexity or scope—that is, complexity or scope at the level of the job as a whole—grew out of Hackman and Oldham's (1975) influential research on the job characteristics likely to motivate employees (Xie & Johns, 1995). At the level of the job, complexity is important in part because of research demonstrating that the positive relationship between intelligence and performance is stronger in complex jobs than in simple jobs (Schmidt & Hunter, 1998).

The second characteristic, situational strength, has been referred to as "the most important situational moderating variable" (Snyder & Ickes, 1985: 904). Situational strength is typically associated with the personality psychologist Walter Mischel (e.g., Mischel, 1968) but has more recently (Meyer, Dalal, & Hermida, 2010) been defined formally in terms of the clarity, consistency, constraints, and consequences associated with situational cues

acting on the person. From a theoretical standpoint, strong situations are believed to dictate appropriate and inappropriate types of behavior and consequently to reduce variability in observed behavior across persons, thereby attenuating the impact of personality and other individual difference variables (Meyer et al., 2010). At the level of the job, for example, Meyer, Dalal, and Bonaccio's (2009) meta-analysis demonstrated that the relationship between conscientiousness and job performance is stronger in weak situations than in strong situations.

However, as alluded to previously, prior research suggests that both situational complexity and situational strength can also vary greatly across time (or situations) within jobs (Meyer et al., 2010; Steele-Johnson et al., 2000). We posit that each of the aforementioned situational units (event, episode, task, and job stage) can be conceptualized in terms of situational strength and complexity and that such a conceptualization can further aid in integrating the situational components of the within-person performance theories.

For example, work tasks vary within a given job, such that some tasks encountered on the job are complex whereas others are simple. As a result, Steele-Johnson et al. (2000) have suggested that complexity functions in an analogous manner at the task and job levels. Thus, just as the ability/skill–performance relationship is stronger for complex jobs than for simple jobs, it may be stronger for complex tasks within jobs than for simple tasks within jobs (Steele-Johnson et al., 2000). Analogous arguments could be made for the effects of complexity at the level of other situational units: The ability/skill–performance relationship may be stronger during more complex job stages and performance episodes and in response to more complex events. Analogous arguments could also be made for the effects of situational strength: The role of employee personality is likely to be stronger during weaker job stages, tasks, and performance episodes and in response to weaker events.

The use of these two situational characteristics can help to integrate the within-person performance theories by making it easier for each theory to "speak" to the other theories regarding the likely analogous effects across levels of situational factors, such as complexity and strength. However, the use of these situational characteristics can also help in the elaboration of individual theories. For example, reinterpreted in terms of situational strength and complexity, Murphy's (1989) transition stages may be thought of as "weak and complex," whereas his maintenance stages may be thought of as "strong and simple." The situational complexity perspective would therefore suggest that the effect of abilities/skills is stronger in transition than maintenance phases, which is consistent with Murphy's own prediction.

More interesting is the juxtaposition of situational strength with Murphy's (1989) stage model. The situational strength perspective would suggest that the effect of personality is stronger in transition than maintenance stages. This is the precise opposite of Murphy's own prediction and permits a competitive test of the two predictions (Platt, 1964). Stated differently, the situational strength perspective facilitates the identification of perhaps the most fruitful area for future research on Murphy's stage model. Future research could begin by empirically assessing whether maintenance stages are, in fact, perceived by employees to be stronger situations than transition stages. Assuming that this is the case, researchers could then test the competing predictions regarding the job stages during which personality is likely to have a greater versus lesser impact on performance (see Table 2 for related questions for future research).

### *Predictor Space*

It is important to clarify the extent to which the predictors of within-person performance variability implicated in the aforementioned theories (see Table 1) themselves exhibit within-person (or within-job) variability. Several experience sampling studies have demonstrated the existence of considerable within-person variability in affect (e.g., Fisher & Noble, 2004; Judge, Scott, & Ilies, 2006). Yet, for several other predictors—for example, situational strength and situational complexity—although theory and some empirical work (e.g., Fleeson, 2007; Stewart & Nandkeolyar, 2007) suggest the likelihood of high within-person variability, experience sampling studies have not yet been conducted, and proportions of within-person variability have consequently not yet been estimated.

Another area where very little is known is the within-person nomological network of these antecedents. For example, future research at the within-person level should continue to integrate self-control strength with affect (building on work by Beal et al., 2005) and should begin to integrate the antecedents from the episodic performance model with the antecedents from the negative feedback loops that characterize control theory (as also suggested by Beal & Weiss, 2013). Future research should furthermore clarify whether affect causes behavior directly or indirectly (i.e., through attention)—a question that is currently undecided (Baumeister et al., 2007; Gendolla, 2000). Ultimately, then, future research should attempt to identify a parsimonious set of proximal motivational antecedents that exhibit considerable within-person variability, that are empirically discriminable at the within-person level, and whose within-person interrelationships and incremental effects on performance are clearly understood.

In other words, much work remains to clarify the within-person nomological network of job performance. Yet, the same could be said of the between-person level. One issue is that accumulating empirical evidence suggests that the conventional view that abilities display high temporal stability over time—a requirement for being a between-person predictor—may be an oversimplification (e.g., Salthouse, Nesselroade, & Berish, 2006). The changing-person model and the adult development perspective suggest that cognitive abilities can indeed change over time—albeit over long periods of time (e.g., months or years or decades)—as a function of task practice and age. More recent models (e.g., Baumeister et al., 2007) suggest that considerable medium-term variability is also likely for at least some abilities, for example, self-control strength capacity. In addition, empirical results suggest that medium-term variability in conventional cognitive abilities may also be somewhat greater than typically believed. To take just one example, Salthouse et al.'s (2006) assessment of 143 adults on three occasions (typically within a 2-week period) revealed that within-person variability in cognitive ability ranged from 8% to 32%. Medium-term variability in cognitive ability scores may be attributable more to transient factors, such as mood (see, e.g., Brose, Lövdén, & Schmiedek, in press), than to individual differences in ability *variability*; however, the phenomenon is not yet well understood, further methodological refinement appears warranted (e.g., testing would ideally be conducted on many more than three occasions), and the psychometric properties of extant measures of ability variability leave considerable room for improvement (Salthouse, 2012). In sum, however, results do indicate that even abilities, which have typically been assumed to exhibit very high stability over time, may in reality exhibit meaningful within-person variability.

A second issue at the between-person level is to understand how the impact of between-person predictors filters through to performance at a given time point—that is, how between-person predictors act through or alter the impact of within-person predictors. An example of such cross-level relationships is the process by which knowledge, skills, and abilities are deployed toward performance on a given occasion. One aspect of this process is that knowledge, skills, and abilities may decrease the need for controlled self-regulation. Specifically, high knowledge, skill, and ability may be associated with a familiarity with a larger variety of situations and, in turn, the development of cognitive scripts to deal with these situations (e.g., Newell, 1990). These scripts are likely to lighten attentional load and therefore to yield appropriate actions that are themselves largely automatic (Johnson et al., 2006). Scripts—and therefore knowledge, skills, and abilities—could thus be viewed as a way of decreasing the complexity and increasing the clarity and consistency of situations (Meyer et al., 2010, 2014). A second aspect of this process is that self-regulation facilitates the effect of knowledge, skills, and abilities on performance. Specifically, self-regulation deploys attention in a way that shields working memory from off-task demands and thereby enhances the elicitation of goal-relevant knowledge, skills, and abilities (Beal et al., 2005; Johnson et al., 2006). Future research should explore questions such as these (see Table 2).

### *Predictor–Criterion Relationships*

Prior research that has measured performance at multiple time points has generally taken one of two approaches. In the first approach, scholars (e.g., Deadrick et al., 1997) measure the predictor at one time point and performance (the outcome/criterion) at several subsequent time points, with the aim of explaining a specific form of performance variability (e.g., a linear trend characterized by an intercept and a slope) via scores on the predictor at the *between*-person level. In the second approach, scholars measure both a predictor variable and performance at multiple time points, with the aim of explaining performance variability per se (rather than variability of a particular form, like a trend) via variability per se in the predictor at the *within*-person level.[4] Both designs are useful, albeit with caveats.

The first of these two approaches is most applicable to predictors that have been theorized and empirically determined to display very little within-person variability. When predictors exhibit within-person variability, we would propose measuring not just performance but also the predictors at multiple time points. For example, although Deadrick et al. (1997) examined the impact of *prior* job experience on changes in job performance, and although we acknowledge the importance of such research for employee selection purposes, in our view, the more general question involves the impact of *changes* in job experience on changes in job performance.

Future research using this approach should continue to delineate whether there exist distinct static predictors of performance intercept, linear performance trend, quadratic performance trend, and so forth. For example, Minbashian, Earl, and Bright (2013) found that the personality trait of openness to experience was associated with neither the performance intercept nor the linear increase in performance trend but rather with the quadratic performance trend, such that the performance drop-off over time occurred more slowly for people who scored higher on openness.

The second approach described above should incorporate time frames derived from theory (Mitchell & James, 2001). For example, the broaden-and-build model suggests that whereas the impact of negative emotions on behavior is virtually immediate, the impact of positive emotions on behavior is gradual. Therefore, the absence of immediate empirical linkages between changes in *positive* affect and changes in creative behavior would not falsify the broaden-and-build model; however, the absence of immediate empirical linkages between changes in *negative* affect and changes in counterproductive work behavior would.

Future research using this approach should attempt to model the extent to which *specific forms* of variability in performance are attributable to the *corresponding forms* of variability in predictor variables. We offer two examples. First, future longitudinal research conducted over several years could examine the extent to which trends in job performance are attributable to the trends in personality predicted by models of adult development (see, e.g., MacCallum, Kim, Malarkey, & Kiecolt-Glaser, 1997). Furthermore, changes to the job situation (e.g., new technology, a promotion) or changes to the underlying situational constructs (e.g., situational strength and complexity) could be modeled as moderators of these relationships. Second, future research could use techniques such as cross-spectral analysis (Warner, 1998) to determine the percentage of variance in a performance cycle of a given periodicity that is attributable to a mood cycle of the same periodicity. For example, it may be the case that although annual mood cycles are highly influential in determining annual performance cycles, weekly mood cycles are not as influential in determining weekly performance cycles: The form taken by weekly mood cycles primarily involves mood improvements during the weekend, when employees are not typically at work and therefore not exhibiting any job performance. Studies such as these would aid in establishing not just within-person predictor–performance relationships but also the specific forms of within-person variability that drive these relationships.

Finally, organizational researchers should consider employing the "measurement burst" technique. As the name suggests, this technique involves multiple "bursts" of data collection, each of which contains multiple surveys (Sliwinski, 2008). A major advantage of this technique is that it is able to differentiate not just within-person variance from between-person variance but also shorter-term within-person variance from longer-term within-person variance and/or relatively reversible within-person variance from relatively permanent within-person variance. Thus, for example, a study aiming to compare the effects of daily and annual mood cycles on performance could employ four surveys in each one-workday measurement burst (i.e., time gap of approximately 2 hours between surveys within a burst) and could employ 16 bursts that are each separated by 3 months. As another example, a study could aim to simultaneously examine (a) the impact of aging on performance through personality and (b) the moderating impact of both job-stage and event-related situational strength on personality–performance relationships. Such a study could employ 8 measurement bursts, 4 each during transition and maintenance stages of the job, with potentially several months separating adjacent measurement bursts, and with each burst consisting of multiple event-contingent surveys that the respondent would complete when he or she encountered a situational-strength-relevant event. We acknowledge that studies such as these will be very ambitious; however, they will be necessary to integrate theories of within-person performance variability that differ from each other in terms of time frame and reversibility of hypothesized change (see Table 2 for related questions for future research).

### *Reverse Causality*

The theories and empirical papers we reviewed typically do not explicitly discuss feedback loops despite the existence of some theoretical arguments and empirical evidence to the contrary. Thus, as seen in Table 1, job performance has typically been viewed as an outcome variable rather than as a predictor variable or as both simultaneously (e.g., Bandura, 1983; Judge et al., 2001; Shea & Howell, 2000). For example, person–environment interactions have typically been thought of as operating within a unidirectional

$$Behavior = f\left(Person, Environment\right)$$

framework or, at best, within a partially bidirectional

$$Behavior = f\left(Person \leftrightarrow Environment\right)$$

framework, when arguably these interactions should instead be thought of as operating within a reciprocal determination framework in which behavior, the person, and the environment all act upon each other rapidly and sequentially (Bandura, 1983). For example, Meier and Spector (2013) recently proposed, and demonstrated, that counterproductive work behavior is likely to be not only an outcome of stressors but also an antecedent to stressors: When an employee engages in counterproductive work behavior, his or her coworkers are likely to retaliate in multiple ways that include withholding needed information from and engaging in uncivil behavior toward him or her. For the focal employee, these coworker behaviors constitute environmental stimuli (stressful or affective events), the structure of which can be explained in terms of situational strength (Meyer et al., 2010) and the outcome of which may be a further escalation of counterproductive work behavior emanating from the focal employee (e.g., Andersson & Pearson, 1999). As another example, Glomb et al. (2011) recently proposed, and demonstrated, that interpersonally oriented citizenship behavior can serve not just as an outcome of mood but also as an antecedent to mood, in particular by helping to *repair bad mood*. Subsequently, the employee is likely to continue to engage in citizenship behavior in order to *maintain good mood* (Dalal et al., 2009).

In some theories, the role of performance as antecedent is implicit. Consider, for example, Baumeister and colleagues' argument (e.g., Baumeister et al., 2007) that self-control strength allows people to resist temptation but that the act of resisting temptation depletes self-control strength. For this argument to hold true in a workplace context, high momentary self-control strength should allow people to refrain from engaging in counterproductive work behavior; however, this act of behavioral restraint should in turn deplete future self-control strength. These illustrations highlight the need for existing within-person theories that implicitly include feedback loops to clearly delineate their existence and their time frames.

In most theories, however, performance has not yet been considered as an antecedent. We therefore encourage the incorporation of feedback loops in additional existing within-person theories as well as the development of stand-alone within-person theories of performance as an antecedent. More broadly, within-person research designs provide a tailor-made opportunity for assessing reverse causality (for instance, by controlling statistically for temporally lagged predictor and outcome scores).

Finally, although our emphasis thus far in this section has been on performance as an antecedent to those constructs that are typically thought of as antecedents to performance, our more general point is simply that within-person theorizing can aid in the conceptualization of performance as an antecedent to other constructs per se. Thus, for example, Sturman and Trevor (2001) found that an employee's performance trend over time predicted his or her propensity for voluntary turnover, even after controlling for his or her most recent performance assessment. As the authors point out, research such as this could aid managers in identifying and targeting interventions at employees who have previously demonstrated themselves to be capable of high performance but whose performance has recently been declining, thereby suggesting that they are at risk of turnover (see Table 2 for related questions for future research).

## Interplay of Theory and Method

As we have alluded to in previous sections, methodological challenges abound when examining questions on within-person performance variability because of the need for intensive within-person research designs, such as experience sampling studies and multi-trial experiments. In the current section, rather than revisit territory already covered by general primers on such research designs (e.g., Beal & Weiss, 2003; Dimotakis & Ilies, 2012), we emphasize the interplay of theory and method. Ideally, methodological choices should both follow from and inform theory (Mitchell & James, 2001). We provide illustrative examples of the interplay of theory and method, particularly with regard to reliability and validity.

### *Reliability*

The theories of within-person performance variability we reviewed previously would by definition be falsified if there is little meaningful within-person variability in "true" performance scores—in other words, if the within-person variability in observed performance scores is attributable primarily to measurement error related to the items in the instrument and/or the occasion of measurement (see Sturman, Chermaie, & Cashen, 2005). Most of the experience sampling studies we reviewed for this paper attempted to address concerns about measurement error by reporting the internal consistency (i.e., coefficient alpha) of performance measures. However, coefficient alpha assesses only item-specific errors (i.e., errors on account of the use of different items for a focal unidimensional measure; Cortina, 1993). Reporting coefficient alpha across all observations and people is inappropriate because it does not acknowledge the possibility of transient errors that may affect performance across several observations (e.g., because a single performance episode stretches across several observations or because of an experienced affective event that disrupts performance across several observations) and that therefore lead to violations of the assumption of independent errors integral to coefficient alpha (Green, 2003). Moreover, reporting the mean of a series of coefficients alpha, one for each time point/observation, is also inappropriate because the specific time points are typically somewhat arbitrary and cannot considered to be sampled randomly (Nezlek, 2007). Therefore, although a low coefficient alpha is problematic and suggests the need for items that are more highly intercorrelated and/or simply the need for more items, even a high coefficient alpha may not be a sufficient indicator for reliability in this context.[5]

To be clear, we do not believe that most within-person variability in job performance will ultimately be found to be due to unreliability. Nonetheless, a necessary step in the validation of the theories we reviewed is to demonstrate meaningful—that is, non-artifactual—within-person performance variability.

### *Validity*

Choices associated with the research design, such as the number of workdays and the number of surveys per workday, may trigger internal validity concerns, such as selective participation and selective attrition (Klumb, Elfering, & Herre, 2009; Shiffman et al., 2008). These concerns are especially pressing when the constructs associated with selective participation or attrition are focal antecedents or types of performance in the theory being tested. For instance, respondents low on self-control strength would normally engage in more counterproductive work behavior. However, these respondents may instead quit the study in disproportionately high numbers, thereby artificially restricting the range of self-control strength scores in the study. This, in turn, is likely to attenuate the relationship between self-control strength and counterproductive work behavior and, consequently, to erroneously "falsify" the theory.

Construct validity concerns, such as reactivity, may come to the fore if participants' scores on performance or antecedents, such as affective states, change on account of the data collection process itself (Moskowitz, Russell, Sadikaj, & Sutton, 2009). Reactivity is a particular concern if the focal theory being tested views interruptions as a source of volatility—that is, short-term, reversible variability—in within-person performance (e.g., Tett & George, 2003). For instance, e-mail or phone-based reminders to take the next survey in an experience sampling design may themselves function as interruptions, thereby exaggerating the within-person variability in affect and performance. In other words, although extant empirical research suggests that reactivity to the method is not a major concern (Shiffman et al., 2008), it may be a greater concern when the theory being tested itself involves reactivity to stimuli.

The research design may also stimulate external validity concerns (Moskowitz et al., 2009) if, for instance, it does not adequately capture the context to which we wish to generalize. For example, although temporal fluctuations in performance can be assessed in both laboratory and field studies, notable differences in these two types of studies may influence the observed variability in within-person performance. In multi-trial laboratory studies, participants usually perform a single, often unfamiliar, task for a short period of time (often less than 30 minutes) on multiple trials, and therefore the "situation" as measured on each trial is often identical in terms of its *objective* underlying properties, although *perceptions* of situational complexity may decrease considerably over time as learning occurs. In experience sampling field studies, in contrast, measurements are taken in situ, and therefore, the situation as measured during each survey may be relatively unique due to the fact that the work tasks being performed and the affective events being experienced—and hence their situational complexity and strength—may fluctuate greatly over time within the same job. The amount and form (e.g., reversible vs. permanent) of within-person performance variability may therefore differ across multi-trial laboratory studies and experience sampling studies—and findings may not generalize across these research designs.

## Practical Implications

In this section, we emphasize how the conventional suggestions for practice that have been articulated on the basis of a static, between-person perspective on job performance provide an incomplete picture and correspondingly need to be modified to account for the dynamic, within-person nature of performance. We divide our recommendations into three domains: employee selection, organizational interventions geared toward employee recovery, and performance appraisal. Within each domain, we provide illustrative recommendations for practice consistent with the theories we reviewed and empirical research on within-person performance variability.

### *Employee Selection*

The existence of within-person performance variability means that employee selection must be thought about in a fundamentally different and more complex way. Organizations should use selection to manage not only initial levels of performance but also long-term performance trends and not only chronic levels of performance but also patterns of momentary levels of performance. We discuss these two issues in turn.

Conventional suggestions for employee selection implicitly or explicitly involve selecting employees on the basis of scores on constructs that predict job performance measured within a short time of hire—with the further assumption that performance is stable across time. However, several of the theories we reviewed (e.g., changing-task model, changing-person model, Murphy's stage model, adult development theories) suggest not only that performance changes over time but also that, as a result, the validities of predictor variables change over time. A subsequent meta-analysis (Hulin, Henry, & Noon, 1990) has lent empirical support to these ideas.

One suggestion, therefore, would be for organizations to make employee selection decisions on the basis of potential antecedent variables' impact on not only initial performance but also long-term trends in performance. For example, Ployhart and Hakel (1998) observed that empathy was related positively to high sales performance in the early stages of the job as well as to the linear rate of increase in performance over multiple quarters but was related negatively to performance decrements via the cubic parameter (see Deadrick et al., 1997, for another example).

Attempting to predict employee performance trends, or more generally, any form of performance variability, however, requires the organization to think carefully about the time frame of primary importance to it (see also Sturman, 2007). Thus, for example, an organization that experiences low turnover may be most interested in maximizing employee performance over the long term and, as a result, may be willing to overlook lower initial performance as long as performance increases to a high level over time. However, an organization that experiences very high turnover may be most interested in maximizing employee performance in the shorter term and, as a result, may require high performance from the very outset. Therefore, it is important for organizations to be more explicit about the time frames of most consequence to them.

Organizations may also wish to restrict within-person performance variability over the short and medium terms—for example, reversible fluctuations from hour to hour or day to day. A suggestion in this regard would be to emphasize individual difference constructs that had previously been neglected but whose importance is suggested by a within-person

worldview, for example, individual differences in within-person affect *variability* (Beal, Trougakos, Weiss, & Dalal, 2013; Eid & Diener, 1999) and individual differences in self-control strength (Gailliot & Baumeister, 2007; Tangney et al., 2004). For instance, it appears likely that selecting applicants with low trait scores on affect variability would dampen within-person variability in affect and, consequently, performance. We hasten to add, however, that organizations must also adopt a nuanced view toward reversible short- and medium-term within-person performance variability and should discourage it only under specific conditions. For instance, variability should be discouraged when people are performing at their maximum levels but encouraged when they are performing at their minimum levels (Martin & Hofer, 2004). Therefore, in addition to selecting for high typical performance, organizations could select for a combination of high maximum performance and low performance variability.

### *Organizational Interventions Geared Toward Employee Recovery*

Conventional suggestions, stemming from older conceptualizations of self-regulation (e.g., Hobfoll, 1989), could involve buffering chronically high job demands with interventions that increase mean (i.e., chronic) levels of job control and/or social support (e.g., Karasek & Theorell, 1990) so as to prevent burnout (Maslach, Schaufeli, & Leiter, 2001) and improve performance. Focusing on mean levels of antecedents is helpful but, due to the existence of within-person variability in antecedents, is insufficient to yield *consistently* high performance.

Theories of events and self-control would suggest the importance of attending to short-term within-person variability in antecedents. Moreover, the interventions that may be derived from these theories share at their core the recognition that within-person episodes of rest and recovery (e.g., Trougakos & Hideg, 2009) are important in maintaining attention and improving future performance and, consequently, that not every episode of nontask behavior should be viewed as "counterproductive" to the organization. As such, organizations should take a more nuanced approach to recovery episodes during work hours and should integrate this understanding into their interventions.

Some suggested interventions would be targeted at the short-term performance implications of relatively rare but nonetheless predictable events. For example, we know that the change to daylight saving time increases sleep deprivation and, consequently, counterproductive work behavior on the following Monday (Wagner, Barnes, Lim, & Ferris, 2012). By providing employees with more flexibility in start time without altering the overall number of hours worked on that particular Monday, supervisors could buffer the impact of the time change on counterproductive work behavior. In other words, permitting and even explicitly encouraging a type of behavior that would normally be considered counterproductive (e.g., arriving at work later than usual) is likely to reduce the incidence of other types of counterproductive work behavior (e.g., browsing the web rather than working).

Other interventions could be adopted on a more quotidian basis. In addition to encouraging employees to actually use their authorized work breaks in activities that enhance recovery (Trougakos & Hideg, 2009; see Kaplan & Berman, 2010, for properties of situations conducive to recovery), managers should recognize that *unauthorized* work breaks may also enhance recovery. Stated differently, as long as overall productivity is not affected adversely, managers should tolerate occasional unauthorized work breaks rather than viewing them as

counterproductive work behavior. Doing so may require organizational compliance and monitoring processes, which often collect performance information continually, to be redesigned to "tolerate" such behavior (see Bhave, in press).

Of course, nonwork hours (e.g., evenings and weekends) are also prime opportunities for rest and recovery. To facilitate recovery, organizations could be more proactive in addressing an issue that has recently burgeoned in importance with the availability of new technologies, such as smartphones—namely, expectations regarding employee responsiveness to work demands and work-related communication during nonwork hours. Beyond that, however, organizations cannot mandate how employees spend their nonwork hours (Binnewies, Sonnentag, & Mojza, 2010). In other words, organizations cannot require employees to spend their nonwork hours resting or performing other activities conducive to recovery. At best, organizations can provide resources (such as discounted gym memberships) and recommendations that enhance recovery during nonwork hours (Binnewies et al., 2010).

### *Performance Appraisal*

Conventional views of performance appraisal implicitly or explicitly ignore within-person variability in performance. Insofar as it is acknowledged at all, within-person variability is considered to be error (Beal et al., 2005). Consequently, raters in organizations are expected to focus solely on their ratees' characteristic (i.e., mean or typical) level of performance during the period across which performance is to be rated (e.g., 1 year in the case of annual appraisals).

However, when left to their own devices, raters do seem interested in and responsive to within-person variability in the ratee's performance (Barnes, Reb, & Ang, 2012). Research in the field of judgment and decision making suggests that summarizing the large amount of information present in dynamic performance profiles severely taxes human cognitive capacity and motivation (Ariely & Carmon, 2003; Kahneman, 2000). Therefore, in summarizing a ratee's dynamic performance profile, a rater is likely to use not just the mean level of performance but also a handful of other defining characteristics of the profile: performance trends (increasing or decreasing scores over the assessment period), performance cycles (waxing and waning performance scores over specific periodicities within the assessment period), extreme (i.e., maximum/peak and minimum/trough) levels of performance in the assessment period, and the most recent (i.e., end) levels of performance in the assessment period (H. Lee & Dalal, 2011; Reb & Cropanzano, 2007). Stated differently, the numerous forms of ratee performance variability featured in the theories we reviewed (see Table 1) are indeed influential in determining raters' judgments regarding ratee performance.

Another alternative would involve performance appraisal systems that explicitly draw attention to various forms of within-person performance variability by requiring raters to make separate judgments regarding trends, troughs, and so forth in addition to mean levels. Subsequently, the weighting of this set of judgments could be based on the organization's goals for ratee performance (Reb & Cropanzano, 2007; Reb & Greguras, 2010). Rewards for past performance (e.g., a bonus based on the ratee's previous year's performance) could be based on the performance mean during that time, ratings of maximum performance could be based on the performance peak, ratings of future "potential" could be based on a combination of the performance trend and performance peak, and so forth. To be feasible, such an approach

would probably require that raters keep notes about ratee performance by recording critical incidents (instances of very low or very high performance) when they occur as well as by recording performance at a few additional, randomly sampled times. The cost of such an approach in terms of added complexity is likely to be outweighed by the superiority of outcomes generated by such an approach relative to the traditional approach of asking the rater merely to make a single "holistic" judgment regarding ratee performance, both because of the loss of information when condensing a record of performance into a single judgment (Ghiselli, 1956) and because of the biased manner in which such holistic judgments are made (Ariely & Carmon, 2003; Kahneman, 2000).

## Conclusion

> Statics, the physicist knows, is only an abstraction from dynamics. Dynamics, on the other hand, deals with the general case and might be described as the theory of how and why something does happen. Thus, only dynamics can give us the real, universally valid laws of mechanics; for nature is process; it moves, changes, develops (Popper, 1957: 39-40)

Our overall assertion in this paper has been that Popper's (1957) observations regarding physical systems could just as easily be applied to their human counterparts and, more specifically, to the job performance of employees. Within-person perspectives on job performance have been with us since the early years of organizational research (e.g., Hersey, 1932). Nonetheless, for most of the history of organizational research, the dominant perspective has either neglected within-person performance variability or else dismissed it as measurement error. In many ways, this between-person worldview was comforting. Research questions were simpler, and therefore so were theories, research designs, and statistical analyses. Moreover, the between-person worldview has produced genuine advances in knowledge and will in all likelihood continue to do so. Yet, by oversimplifying the phenomenon of job performance, we have oversimplified our science as well as the recommendations we provide to practitioners. And, in so doing, we have neglected the admonition—attributed to Einstein—that things should be made as simple as possible but not more so. It is our hope that the current paper invigorates discussion of this important, yet understudied, phenomenon.

## Notes

1. Additional evidence is provided by a recent meta-analysis (Shockley, Ispas, Rossi, & Levine, 2012), although conclusions should be viewed as preliminary due to the presence of only three primary studies at the within-person level. The meta-analytic correlation between affect and performance was very similar across levels ($r$ = 0.16 and 0.14, respectively) for positive affect but was considerably weaker at the between-person level than at the within-person level ($r$ = –0.13 and –0.32, respectively) for negative affect.

2. The commonly held view that maximum motivation is a necessary condition for maximum performance (Sackett, 2007) appears to define the construct of maximum performance through its antecedents, which is undesirable (see Dalal, 2013; Dalal, Brummel, Wee, & Thomas, 2008). Therefore, we suggest that the respective influences of motivation and ability on performance be determined empirically rather than assumed by *fiat*.

3. Self-control (the term we use in this paper in the context of this particular theory) has also commonly been referred to in past research as self-regulation and, more colloquially, willpower. Self-control strength has also commonly been referred to as regulatory resources. Self-control strength depletion has also commonly been referred to as resource depletion and, in homage to Freud, ego depletion.

4. In some cases, between-person predictors may also be added to the latter design, thereby achieving a certain amount of convergence across the two designs.

5. To mitigate concerns related to transient error, researchers have proposed alternative approaches to estimating reliability coefficients for temporal data (see Nezlek, 2007, who has advocated using measurement models within multilevel modeling to estimate reliability; see also Becker, 2000, and Green, 2003, for alternate indices; and see Cranford et al., 2006, for an approach based on generalizability theory).

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