# A Dynamic System of Job Performance with Goals and Leadership Changes as Shocks

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ABSTRACT

Two consistent predictors of salesperson job performance include goals and leadership. Much of the research related to these domains, however, has two limitations. First, it is removed from an understanding of how effects operate when performance is viewed as a dynamic system, or a construct with inherent feedback loops and a tendency to ebb and flow over time. Second, it focuses on leadership behaviors rather than leadership changes (i.e., experiencing a change in one's supervisor), even though employees in today's workforce often experience the event of having a leader replaced. We extend this literature by establishing and testing a theory of performance system dynamics such that key principles of dynamics regarding performance over time are integrated and tested. Moreover, these two predictors, salesperson goals and leadership changes, are represented as exogenous inputs or shocks. Repeated measures data on sales employees obtained over six months provide evidence of performance system dynamics, reflecting not only patterns of consistency but also responses to external forces. Findings also reveal that company-assigned goals (i.e., quotas) are a significant predictor of effort and performance beyond the employees' typical behavior and nullify any potential negative impact of leadership changes. The paper concludes with implications for both research and practice.



*Keywords*: job performance, dynamics, systems, goals, personal selling, sales

## 1. Introduction

Job performance, which refers to the actions individuals engage in at work that contribute to organizational goals, is a core construct in business research. Campbell & Wiernik (2015) state that it "drives the entire economy" and without it there can be no "team performance, no unit performance, no organizational performance, no economic sector performance, no GDP" (p. 47-48). Given its importance, a vast body of literature has examined how to motivate job performance (Miao & Evans, 2013; Kanfer & Chen, 2016; Kanfer, Frese & Johnson, 2017; Breevaart et al. 2016; Khusainova et al. 2018).

Although many motivating levers can be used to influence individual job performance, Landy & Conte (2016) suggest that leadership and goals are often the most useful. The first, leadership, is perhaps one of the oldest and most widely studied concepts in organizational research (Lord et al., 2017), and it demonstrates consistent relationships with employee performance (Burke et al. 2006; D'Innocenzo, Mathieu, & Kukenberger, 2016; Alavi et al., 2018). Although much literature documents the effects of leadership *behaviors* on employee actions (Frieder, Wang, & Oh, 2018; Judge &Piccolo, 2004; Lord et al., 2017; Murphy & Anderson, 2020; Van Dierendonck, 2011), we know less about the effects of leadership *changes* on subordinate performance over time – i.e., what happens when employees experience their leader being replaced? Such an event could manifest positively as it provides an opportunity to interact with a new individual, but it may also create a sense of uncertainty and restrict the necessary time required to build high-quality exchange relationships between leaders and followers, resulting in worse employee performance.

The second lever, goals, has been widely studied for its effects on motivation and performance (Kanfer, Frese & Johnson, 2017; Lock & Latham, 1990; Katsikeas et al., 2018). In

sales research, which is the domain of study within the current investigation, goals are often examined in one of two ways: as "quotas" assigned by the firm or as self-set goals influenced by these quotas (Fu, Richards & Jones, 2009; Katsikeas et al., 2018). Quotas are frequently used as a control system to increase sales force productivity and align salesperson behavior with organizational priorities (Ahearne et al. 2010b). Specifically, control systems affect how sales employees are compensated, based either on behaviors or outcomes (Ahearne et al. 2010b; Katsikeas et al. 2018). Under outcome-based control systems, salespeople are accountable for tangible results, and compensation is directly tied to achieving a company-assigned quota. Hence, many firms assign goals or quotas to motivate employees to achieve better results (Ahearne et al. 2010a; Katsikeas et al. 2018).

Studies of goals, leadership, and performance at times contain a looming assumption about performance in the background: that is, performance growth. A commonly evoked premise in sales research is that job performance must constantly improve (Bolander, Dugan & Jones, 2017; Ahearne et al., 2010b). In many cases, whether published in academic journals or practitioner-oriented books such as *High Growth Handbook* (Gil, 2018) or *Hyper Sales Growth: Street-Proven Systems & Processes* (Daly, 2014), authors make an implicit assumption that salespeople must (and therefore do) continually improve. Hence, salesperson quotas are believed to consistently increase based on past performance. This idea then transfers to the methods and statistical techniques employed in research (c.f., Jaramillo & Grisaffe, 2009; Dugan, Rouziou & Bolander, 2020). A majority of studies examining sales performance over time do so using growth curve models (Bolander, Dugan & Jones, 2017), which assume that the patterns researchers observe are realizations of a continually growing phenomenon.

In this paper, however, we advocate that an emphasis on performance growth is problematic for several reasons. First, even though "difficult" goals are encouraged in goal theory, a consistent emphasis on performance growth may eventually lead to unobtainable goals, which can be demotivating (Fang, Palmatier & Evans, 2004) and cause stress, fatigue, and burnout (Edmondson et al., 2019; Chan & Wan, 2012; Cho et al., 2017; Peasley et al., 2020). With finite resources (e.g., time) and environmental turbulence (e.g., crises or pandemics) out of the salesperson's control, continually increasing quotas and having consistent expectations of growth may be detrimental.

Second, considering sales performance as an ever-growing phenomenon contradicts (a) several theories on the continuity and persistence of human behavior and (b) recent calls for a greater appreciation of performance as a dynamic system. For example, behavioral consistency theory (Funder & Colvin, 1991) suggests that one of the best predictors of what someone will do in a given circumstance is what he or she did under similar circumstances in the past (Good, Hughes, & Wang, 2021). Likewise, the psychological inertia theorem (Walters, 2018) proposes that individuals often demonstrate behavioral continuity or the expression of similar behavior across time due to recurrent cognitions. Some initial evidence supports these ideas (Fisher & Noble, 2004; Zyphur et al., 2008), but a gap continues to remain in our understanding of salesperson performance as a dynamic system with external influences. In fact, what these theories imply is that rather than a continuous emphasis on growth curve trends, research is urgently needed to determine what may predict performance in a stable, dynamic system of salesperson effort and performance. Indeed, several calls currently exist for more research on performance as a dynamic system (Dalal, Bhave & Fiset, 2014; Sonnentag & Frese, 2012).

To address this gap, we examine sales employees' effort and performance repeatedly over six sales cycles. We develop a theory on performance system dynamics by specifying performance inertia or self-similarity, examining reciprocal relationships between performance dimensions, and describing how motivating levers – such as goals and leadership changes – can be thought of as external shocks to performance. Findings reveal that effort demonstrates significant autoregressive effects, whereas actual sales performance does not. Nonetheless, effort and goals predict concurrent performance, and leadership changes in the presence of assigned goals do not have a significant effect on salesperson effort or performance, even when controlling for job experience. Our paper thus provides a unique description of the merits of goals and leadership and how they fit into the broader scheme of performance as a dynamic system.

Based on these findings, our research offers two primary contributions. First, we advance knowledge regarding performance as a dynamic system. Unfortunately, many studies of job performance ignore or place key principles of dynamics in the background while an urgent need remains for research on performance dynamics in real jobs (Dishop, Olenick, & DeShon, 2020; Sonnentag & Frese, 2012). We present a novel theoretical perspective that integrates principles of dynamics with theories of psychological inertia and continuity, and we test these ideas among sales employees. We show that researchers need not only focus on growth to make inferences about important motivational levers. Our second contribution is offering information on the relatively unknown effects of leadership changes, rather than leadership behaviors, as we evaluate whether this variable relates to performance above and beyond (a) the effects of company-assigned goals (quotas) and (b) the natural ebb and flow inherent to performance.

Our paper is organized as follows. Given the complexity of the issues we discuss, it is necessary to move sequentially through several sections. First, performance is our key outcome of interest, so we begin with a discussion of its dimensions. Then, we briefly describe different views on performance over time and highlight dynamics as one possible inferential lens. After adopting this view, it becomes necessary to establish a theory regarding performance dynamics and its various components. A large portion of this paper, therefore, is devoted to articulating each aspect of performance when viewed as a dynamic state moving through time. After describing performance as a dynamic system, presenting theory on its various components, and establishing hypotheses about relationships over time, we move to the application of goals and leadership changes as shocks to that system. Following our analyses and results, we discuss theoretical implications and actionable managerial insights, as well as suggestions for future research.

## 2. Theoretical framework and hypotheses development

### *2.1 Performance as a Dynamic System*

First, it is necessary to situate ourselves in the high-dimension space of performance. Campbell & Wiernik (2015) argue that job performance has a complex, multi-dimensional structure, and it includes such factors as technical performance, effort, communication, and counterproductive work behaviors (among others). Moreover, recent research on salesperson performance specifically highlights differences between *behavioral performance,* defined as the actions people take at work to transform inputs into outputs such as adaptive selling, making sales presentations, relationship management, cross-/up-selling, effort, or controlling expenses, and *outcome performance*, defined as the results of those actions such as profitability, market share, new accounts generated, units sold, or revenue generated (Zallocco, Pullins, & Mallin,

2009; Beck, Beatty, & Sackett, 2014; Bolander et al., 2021). Consistent with prior research on performance in contexts similar to the one studied here (e.g., Stewart & Nandkeolyar, 2007), we examine both behavioral (effort) and outcome (sales) performance (c.f., Campbell & Wiernik, 2015).

There are also different lenses through which one can examine the longitudinal nature of performance (Dalal et al., 2014; Sonnentage & Frese, 2012). We draw from and integrate several theoretical principles outlined in Cronin & Vancouver (2018) and Dishop et al. (2020b) to specify the ways in which performance exhibits dynamics. Figure 1 demonstrates the theoretical model. Broadly, dynamics is concerned with transition rules and external inputs governing state movement from time *t* to *t + 1*. Each feature in Figure 1 is an effect classified either as a transition rule or external input. Cronin & Vancouver (2018) state that clearly delineating these rules and inputs is the first step in advancing dynamic systems theory.

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Insert Figure 1 Here

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*2.1.1 Transition Rules: Inertia & Stationarity*

The first two features of a dynamic system include inertia and stationarity, which can be thought of as effects pertaining to the transition rules governing state movement from *t* to *t + 1*. Inertia is the idea that the prior conditions of a system are reflected in future conditions such that a construct retains something about itself from *t* to *t + 1*, and stationarity refers to a system with a probability distribution that does not change when shifted in time. Beginning with the former, theories of consistency and continuity suggest a link between current and future employee performance, such as psychological inertia theorem (Walters, 2018) or behavioral consistency

theory (Funder & Colvin, 1991). Similarly, Cialdini, Trost, & Newsom (1995) suggest that many individuals are motivated to appear stable to their peers and attempt to do so by engaging in similar actions over the course of several interactions. What these theories imply for the aspects of performance studied in this research – effort and sales – is that they may persist over time, with effort (sales) at time *t* relating to effort (sales) at time *t + 1*. Indeed, prior research finds positive autoregressive effects for both employee effort (Lord et al., 2010) and sales (Stewart & Nandkeolyar, 2006). Extrapolating from these ideas, we expect both effort and sales to demonstrate inertia such that each state relates to itself from *t* to *t* + 1.

*Hypothesis 1*: Within-person sales at time *t* will positively relate to sales at time *t* + 1.

*Hypothesis 2*: Within-person effort at time *t* will positively relate to effort at time *t* + 1.

The second feature, stationarity, can be thought of as the extent to which there is stability in effort and sales. When a state contains inertia, it realizes either a stable or unstable trajectory across time depending on the size and valence of the transition coefficient. It may exhibit stationary behavior with fluctuations around an equilibrium point, unbounded growth or decay, or explosive oscillations that increase in size at each period. Vancouver, Wang, & Li (2018) show that non-stationary self-regulatory systems produce unstable behaviors that are inconsistent with field observations of performance. Likewise, prior research offers some indication that performance converges to stability over time (Thoresen et al., 2004; Boswell, Boudreau & Tichy, 2005; Chen, 2005). We therefore predict that both sales/results and effort will be stationary.

*Hypothesis 3*: Sales will be stationary.

*Hypothesis 4*: Effort will be stationary.

*2.1.2 Transition Rules: Reciprocal Relationships & Feedback*

The next component to our theory of performance as a dynamic system is feedback; and in this section, we describe the relationship between effort and sales and then feedback from sales to effort. The theoretical starting point for the former – a relationship between effort and sales – comes from the basic notion that employees must invest effort in order to accomplish core tasks and achieve outcomes (Humphrey, Nahrgang, & Morgeson, 2007). Much research exists at the between-person level finding that effort is positively related to performance (Fang, Palmatier & Evans, 2004; Krishnan, Netemeyer & Boles, 2002). In longitudinal contexts, day-specific work engagement predicts personal initiating behavior (Schaufeli & Bakker, 2004), effort acts as a concurrent predictor of day-level performance (Fisher & Noble, 2004), and in multiple goal settings individual initiating strategies predict individual performance (DeShon et al., 2004). Consistent with these arguments, we predict a positive within-person relationship between concurrent effort and sales.

*Hypothesis 5*: Within-persons, effort at time *t* positively relates to sales at time *t*.

Next, we draw from self-regulation theories to specify why sales may feedback into later effort. Neal, Ballard, & Vancouver (2017) suggest that individuals monitor discrepancies or make comparisons between (a) goal states (such as performance levels or outcomes) and (b) perceptions of their current standing on such variables. This process has been described as a control system or feedback loop and assumes the salesperson not only monitors the variable but also responds to the discrepancy between the current state of that variable and the goal (Neal, Ballard &, Vancouver 2017; Donovan & Williams, 2003). Reactive control involves responding to discrepancies as they occur whereas as proactive control requires the person to act preemptively before discrepancies occur (Jagacinski & Flach, 2003). In our study, this would mean that individuals use their perceptions of discrepancy to make decisions about resource

allocation – both where to direct it and how much to provide. In other words, whether or not an individual provides effort may depend on the extent to which her sales met expectations in the previous period. Vancouver et al. (2002) find negative within-person relationships among performance and subsequent motivational states and suggest that high performance in past periods triggers lower resource allocation in subsequent periods because the individual has no motivating discrepancy to reduce. The same reasoning could be applied to the relationship between sales and effort. From a control theory perspective, an employee may provide lower effort after he or she yields high sales in a previous period because there is no signal that extra effort investment is required. Based on this reasoning, we predict a negative within-person relationship between sales and subsequent effort.

*Hypothesis 6*: Within-persons, sales at time $t$ negatively relates to effort at time $t + 1$.

*2.2 External Inputs: Shocks*

The concept of shocks is the final feature in our theoretical model of performance as a dynamic system. It captures the set of time-variant, exogenous predictors of the core performance states described above (effort and sales). The first shock is leadership change. Leadership is an immense research area (Avolio, Sosik, & Berson, 2012; Lord et al., 2017), as practitioners and researchers alike have long espoused the important ways in which leaders affect organizational functioning. Leadership is related to a host of individual and organizational attributes (Derue et al., 2011; Hartnell, Ou, & Kinicki, 2011) and much of this research emphasizes leadership behavior and the resulting attitudes and behaviors of their followers. In contrast, our interest is not on the effects of specific behaviors enacted by the leader but instead the employee's experience – in terms of performance dynamics – of having a leader replaced, potentially with some frequency.

We draw from uncertainty theories to consider how leadership changes may shock performance. In the occupational health literature, the stress-coping-adjustment paradigm suggests that job transitions create stress because they expose employees to greater uncertainty in their environments and disrupt their daily routines (Feldman & Ng, 2013). Normally, this framework is used to understand the implications of job changes (e.g., Brett, Feldman, & Weingart, 1990), but a similar feeling of uncertainty and disruption may arise for employees after experiencing a leadership change. Similarly, uncertainty management theory (Lind & Van den Bos, 2002) suggests that several organizational situations – such as mergers and large company changes – lead employees to feel unsure of their future outcomes and identities. We view a leadership change as another situation that may lead to feelings of uncertainty, particularly when considering that leaders can forge close-knit ties through leader-member exchange (Alavi et al., 2018). Although Lind & Van den Bos (2002) proposed uncertainty management theory largely to describe the connection between fairness and uncertainty, beneath their writing lies a fundamental idea that is relevant for our purposes: uncertainty is something to be coped with – it has the potential to harm the individual. Uncertainty is also embedded in some of the discussions of newcomer socialization (Wanberg, 2012) such that ambiguous socializing techniques can foster lower productivity (Miller & Jablin, 1991).

An alternative view that leads to roughly the same conclusion is to consider what is *not* happening when leaders change. During and after such an event, potential interactions between supervisors and employees are removed, so there is less time to create functional and productive relationships. Research on leader-member-exchange and job embeddedness (Mitchell & Lee, 2001; Ng & Feldman, 2007) shows that high quality relationships between leaders and followers have the potential to produce effective individual and team functioning (Dulebohn et al., 2012;

Ilies, Nahrgan, & Morgeson, 2007; Nishii & Mayer, 2009). But when such high-quality relationships are thwarted, these positive outcomes remain unexploited. Given the reasoning above, both in terms of uncertainty and reduced interactions, we predict that leadership changes disrupt performance over time, acting as inputs that negatively relate to concurrent behaviors and results.

*Hypothesis 7*: Within-salespersons, leadership changes at time *t* negatively relate to effort at time *t*.

*Hypothesis 8*: Within-salespersons, leadership changes at time *t* negatively relate to sales performance at time *t*.

The second shock is company-assigned goals (quotas). Goals help focus attention and action, motivate persistence and energy, and activate subconscious knowledge and strategies consisting of goal-relevant material (Locke & Latham, 2019). Past research has shown that quotas influence effort and sales performance through increased motivation, including serving as a reference point for self-set goals and influencing self-efficacy (Fang, Palmatier & Evans, 2004; Fu, Richards & Jones, 2009). Researchers studying goals have typically assessed one of the following: (1) between-person, cross-sectional relationships among goals and other variables, (2) relationships among constant, externally set goals and other variables (Hardy, Day & Steele, 2019), or (3) how employees change their own goals after performing a task (Donovan & Williams, 2003; Brown, Jones & Leigh, 2005). Consistent with the second approach, we study a unique situation in which employees have company-assigned goals (i.e., quotas) that are exogenous to the employees themselves (i.e., employees do not set their own goals nor are goals based on past performance but rather company needs). For the salespeople in our study, goals can and do change at each period based on what the employing firm forecasts. In the current

context, therefore, goals can be thought of as inputs that are free from influence by effort and sales but that can still change at each period. To understand the relationship among concurrent goals, sales, and effort we draw from goal setting theory (Locke & Latham, 1990). Difficult, specific goals are thought to produce high performance and effort, so this would manifest as a positive relationship between goals at time *t* and the system states at time *t* such that low goals would relate to lower effort and sales whereas high goals would relate to higher effort and sales. We do not have the methods to make causal claims, but conceptually you can think of it as goals "punching" the trajectories of effort and sales at each period.

*Hypothesis 9*: Within-persons, goals at time *t* positively relate to effort at time *t*.

*Hypothesis 10*: Within-persons, goals at time *t* positively relate to sales performance at time *t*.

## 3. Method

### *3.1 Participants and Procedure*

To test our hypotheses, we obtained data from a large B2C sales firm based in the Midwest. All employees worked for this single firm and targeted customers within the U.S., with all customer interactions taking place over the phone. The company maintains records of employee calls and performance, and employees were compensated in direct proportion to their performance, which was assessed by the company. Our sample included 135 sales employees over six months of observations (i.e., six sales cycles) for a total number of 810 observations. Each month, the organization assigned a unique goal to each employee, indicating his or her expected number of units to sell. Goals were based on salesperson specialty (e.g., the specific service/product sold), business needs such as expected commission payouts, and upcoming production (at the organization level). An employee therefore did not create his or her goal

individually or have input into the quota. Commissions were based on employee performance with respect to his or her individual goal.

Sales employees also had leaders encouraging them to complete their goals. One leader was responsible for anywhere between five and 15 employees, and a vast majority of the leader's day was spent speaking with, encouraging, and supporting those employees. No data were obtained on leadership behaviors or employee perceptions of leader attitudes – they are not the focus of this study and data on such variables were not available. What is relevant to this study, though, is that leaders sometimes changed, meaning that an employee could have experienced anywhere from one to six different leaders across the observed study duration and the changes could have occurred systematically (every month) or sporadically (e.g., the first month, the sixth month, the middle two months, never, etc.). In a high-pressure sales environment, such leadership changes are not unusual, particularly in sales organizations or call centers. In fact, an extensive literature base highlights the prevalence of turnover in sales (e.g., Boles et al. 2012; Sunder et al. 2017) and this turnover is not constrained to just the frontlines (Lemken & Rowe, 2020).

*3.2 Measures*

Our choice of interval spacing follows Stewart & Nandkeolyar's (2006) recommendation: "In practical work settings…a performance episode is best captured as the time-frame within which employee performance is monitored and reported" (p. 311). In our sample, company-wide data were tracked monthly, so our assessments are by month. Each measure was captured at times one through six, and each monthly observation represents one sales cycle.

*Results.* Sales (outcome performance) refers to the number of units sold per month.

*Effort*. Effort (behavior performance) was operationalized as the average number of minutes spent speaking with a customer or client per month. Cravens et al. (1990) called the amount of face-to-face and phone time (i.e., minutes speaking to clients each month) as the "most appropriate measure of selling effort," (p. 224). This variable is a key indicator of effort tracked by the company.

*Goals.* Employees received sales goals (i.e., quotas) at the start of each month. Goals were on the same scale as sales performance and, again, they were set externally by the organization.

*Leadership Change.* Leadership change refers to whether the focal employee was working under a different leader in the current compared to the previous month. This variable was indexed with a simple "yes" (1) "no" (0) and incorporated as a predictor. No employees in the analysis were themselves leaders.

*Experience.* Experience is a measure of job tenure provided by the company. We employ experience as a control variable, as past research has shown that job experience can impact sales performance (Rapp et al., 2020).

*3.3 Analysis*

Dynamics is the inferential lens of interest – as opposed to other longitudinal options such as growth models – and to appropriately infer such relationships from longitudinal data, it is necessary that the analysis incorporate/account for several pieces, including dynamic panel bias, unobserved heterogeneity, initial conditions, and stationarity. Accounting for each helps to avoid biased parameter estimates and ensures the applied statistical model is consistent with the espoused predictions and theory.

Dynamic panel bias is largely a function of using a lagged response variable (DV) as a predictor, which is a cornerstone of dynamic modeling (Keele & Kelly, 2006) but forces a

correlation between that predictor and the model errors. The second issue, unobserved heterogeneity, refers to stable, unobserved individual differences that result in different trajectories across individuals, and it produces biased parameters and inflated Type I errors if modeled incorrectly. Third, the crux of understanding and representing system dynamics is to begin by identifying starting values or initial conditions before specifying the transition rules that drive the system states to each subsequent time point (DeShon, 2012). To remain consistent with this view, statistical models meant to capture dynamics often condition on the first observation (e.g., Bollen & Brand, 2010). Finally, past research has demonstrated that non-stationary trajectories found in longitudinal or panel data will appear related in regression-based models even when the states are independent in the data-generating process, so it is important to ensure a stationary system of variables to avoid identifying spurious patterns (Granger & Newbold, 1974; Nelson & Kang, 1984). To cover these issues, we assess stationarity on the autoregressive variables (effort and sales) and then use a statistical model that is appropriate for dynamics as recommended by Xu, DeShon, & Dishop (2019) – it accounts for unobserved heterogeneity, suffers from less dynamic panel bias than other options such as random-coefficient modeling or hierarchical-linear modeling, and conditions on the first observation.

We use a nested models approach to identify the most parsimonious model with which to evaluate our hypotheses. The base model for each variable/state, effort and sales, is consistent with the dynamic panel model presented in Xu et al. (2019) and Bollen & Brand (2010), as demonstrated in Figure 2. Taking sales as an example, the statistical model treats sales at the first time point as the lone exogenous variable (i.e., conditions on the first observation) and sales at times 2, 3, 4, 5, and 6 as response variables. Unobserved heterogeneity is included as a latent term with basis coefficients set to 1 over sales at times 2, 3, 4, 5, and 6, and this term is allowed

to covary with the lone model predictor: sales at the first time point. Allowing unobserved heterogeneity to correlate with the model predictors creates a fixed effects representation (fixed effects in this context refers not to variation in coefficients but instead the relationship between unobserved heterogeneity and the model predictors) (Xu et al., 2019; Bollen & Brand, 2010). The coefficient representing the relationship between results at time *t* and results at time *t + 1* is freely estimated and is the autoregressive path used to evaluate Hypothesis 1. The same core dynamic panel model is used for effort. Panel A of Figure 2 demonstrates two autoregressive dynamic panels, one for effort and the other for sales. Panel B shows an additional path relating effort to concurrent sales, and Panel C shows a reciprocal model such that effort relates to concurrent sales and sales then predicts subsequent effort. Panels A and B are nested within C, so we begin with the full reciprocal model (C) and impose constraints until model fit is sufficiently damaged so as to warrant use of one of the more complex models. The familiar $\chi^2$ difference test will be used such that, when comparing a reduced, simpler model nested within a full model, when the test is significant it warrants use of the better fitting but more complex model. The hypotheses concerning goals and leadership changes are then evaluated by retaining the dynamic model identified from the steps above and applying both variables as concurrent predictors of effort and results.

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Insert Figure 2 Here

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The last analysis component is not directly related to dynamics, per se, but more a matter of the clustering of the longitudinal data captured in this paper. One way to think about the data is as a multi-level structure with time nested within persons and persons nested within leaders

(remember that leaders are not necessarily consistent, some employees experience new leaders across months). The relevant variable is leadership change – yes or no. Such nesting is easy to account for with random-coefficient modeling by allowing random components, but these models are inappropriate for dynamic analyses (Moral-Benito, Allison, & Williams, 2019; Allison, Williams, & Moral-Benito, 2017). Under a structural equations modeling framework, which is used here, researchers often opt for centering the higher-level variable. For our analysis, we centered performance by standardizing each variable within leader, such that we calculated a mean performance for each leader across time and employees and then subtracted this value from each observed score of performance by employee and time point.

## 4. Results

### *4.1 Descriptive Analyses*

All analytics were completed in R using the *lavaan* package for structural equations modeling (Rosseel, 2012). Descriptive statistics regarding effort, sales, goals, and leader changes are found in Tables 1-5. Table 1 demonstrates that the between-person means and standard deviations of sales, effort, and goals remained relatively stable across time (see the next section for unit root tests). The leadership change column reports the total number of leadership changes across the sample at each time point. At time point three, for example, 12 employees experienced a leadership change. No employee experienced more than two leadership changes across the six time points, and no employee experienced a leader returning after leaving.

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Insert Tables 1 & 2 Here

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Tables 2 and 3 report, respectively, between-person correlations for effort and sales across time. Both tables provide evidence of a simplex pattern among the correlations, such that same-variable correlations at longer lags demonstrate lower correlations than what is observed at smaller lags. Correlations among the primary study variables are presented in Tables 4 and 5, with Table 4 reporting the between-person correlation among each variable at a single time point and Table 5 presenting descriptive statistics on within-person correlations. Beginning with Table 4, the only significant between-person correlation at time 3 is the positive relationship between effort and sales ($r = 0.21$, $p < 0.05$). Moving to the within-person correlations in Table 5, the values in each cell show the mean and standard deviation of all within-person correlations among each respective pair of variables. For example, the average within-person correlation among effort and sales is 0.33 with a standard deviation of 0.47, indicating substantial variability in that within-person relationship. To calculate these values, we filtered the data to a single individual, calculated his or her within-person correlation (across time) among effort and sales, repeated this procedure for each individual to create a distribution of within-person correlations, and then calculated the mean and standard deviation of this distribution. Notice that the standard deviations for each average within-person relationship are relatively large compared to the mean, indicating variability in within-person patterns.

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Insert Tables 3, 4 & 5 Here

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*4.2 Main Analyses*

The main analysis consists of three phases: assessing stationarity (Hypotheses 3 and 4), nested model comparisons on the dynamic panels to select the most parsimonious model, and

then evaluating the relationships. Beginning with stationarity among the two dynamic variables, effort and sales, we used a panel version (Im, Pesaran, & Shin, 2003) of the Augmented Dickey-Fuller (ADF) test, which is the most commonly used unit root test to distinguish stationary from nonstationary series (Dickey & Fuller, 1979; Said & Dickey, 1984). The null hypothesis of this test is that the states contain a time-dependent error term (i.e., non-stationary), so significant results indicate stationary variables. In support of Hypotheses 3 and 4, sales (ADF = -7.9, $p < 0.05$) and effort (ADF = -7.8, $p < 0.05$) were both stationary. Plots of the raw trajectories for both sales and effort are shown in Figure 3; the between-person mean and standard deviation of both variables remain stable across time.

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Insert Figure 3 Here

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Moving to the model comparisons, fit for the reciprocal dynamic panel model shown in Panel C of Figure 2 was adequate ($\chi^2_{(54df)} = 97.1$, $p < 0.05$; CFI = 0.96; TLI = 0.95; RMSEA = 0.07; SRMR = 0.07). To create the nested concurrent model (Panel B), we constrained the relationship from results at time $t$ to effort at time $t + 1$ ($\beta_2$ in Figure 2) to be zero, which resulted in an additional degree of freedom for the constrained model (Table 6). A $\chi^2$ difference test indicated that there was no significant difference in the fit between these models, suggesting that the more parsimonious, concurrent dynamic model could be retained for subsequent analyses. We then compared the concurrent dynamic panel model to an even more parsimonious autoregressive model, which could be created by constraining the concurrent relationship between effort at $t$ and results at $t$ to be zero. A $\chi^2$ difference test indicated that there was a significant difference between these two models ($\Delta df = 1$, $\Delta\chi^2 = 26.1$, $p < 0.05$), such that the

autoregressive model diminished fit to such a degree as to warrant use of the concurrent dynamic panel model. Table 6 provides the full results of the nested model comparisons. Thus, we retained the concurrent dynamic panel model (Panel B of Figure 2) for assessing relationships among the study variables. The full substantive model was then created by taking the concurrent dynamic panel model and incorporating goals and leadership changes as concurrent predictors of effort and sales. Because these two additional predictors were exogenous in the models, they were allowed to covary with the other exogenous variables: sales and effort at time 1 and both unobserved heterogeneity terms. We also included employee experience as a control variable.

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Insert Table 6 Here

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Hypothesis 1 predicted a positive relationship between sales at time *t* and sales at time *t + 1*. As shown in Table 7, the results suggest that the relationship between sales at *t* and sales at *t + 1* was not significantly different from zero ($\beta = 0.002$, $SE = 0.044$, $p = 0.97$). Hence, this hypothesis remains unsupported. Hypothesis 2 predicted a positive relationship between effort at time *t* and effort at time *t + 1*. The observed relationship between effort at *t* and effort at *t + 1* was 0.30 ($SE = 0.06$, $p < 0.05$); thus, this hypothesis was supported. Hypothesis 5 predicted a positive relationship among concurrent effort and sales. Effort at *t* was indeed significantly related to sales at *t* ($\beta = 0.03$, $SE = 0.007$, $p < 0.05$). Hypothesis 6 predicted a relationship between sales at *t* and subsequent effort ($t + 1$). Constraining this relationship to zero did not significantly change model fit, so Hypothesis 6 was not supported. Finally, Hypotheses 7 and 8 predicted negative relationships between leadership changes at *t* and sales and effort at *t*, respectively. Somewhat surprisingly, neither of these relationships were significantly different

from zero (predicting sales at $t$: $\beta$ = -0.49, $SE$ = 0.52, $p$ = 0.34; predicting effort at $t$: $\beta$ = 2.9, $SE$ = 3.4, $p$ = 0.39), which we discuss below. Hypotheses 9 and 10 predicted positive relationships between concurrent goals and sales and effort, respectively. The relationship between goals at $t$ and sales at $t$ was positive ($\beta$ = 0.073, $SE$ = 0.024, $p < 0.05$), as was the relationship between goals at $t$ and effort at $t$ ($\beta$ = 0.35, $SE$ = 0.14, $p < 0.05$).

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Insert Table 7 Here

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In summary, effort demonstrated significant autoregressive effects whereas sales did not, effort predicted concurrent sales, and goals were related to both concurrent effort and sales; however, in the presence of assigned goals, leadership changes did not have a significant effect on effort or sales. Table 8 summarizes our hypotheses and findings.

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Insert Table 8 Here

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## 5. Discussion

Salesperson performance has important consequences for organizations, so it is important for researchers to be able to monitor, predict, and understand its movement. Given the increasing demand for an understanding of performance dynamics, we investigated principles such as inertia, stationarity, feedback, and shocks over time. Each principle was placed into a framework describing salesperson job performance as a dynamic system. After establishing this framework, we integrated several theories to predict various patterns and effects, including theories of inertia and stability, self-regulation, and uncertainty. Results revealed that employee effort and sales

were stationary, meaning that the statistical properties of performance remained stable over time despite effects stemming from autoregression and external shocks. These findings show that the current emphasis on growth in sales research may not always hold. Although organizational activities can certainly cause an initial spike in behavior and performance, over time it is more likely that these fluctuations level out to reveal consistency and stability.

Our results also demonstrated that, within the relative stability of effort and sales, assigned goals were significant predictors of their fluctuations, even when controlling for job experience. Conversely, leadership changes were not significant predictors of the performance system states. With goals present, leadership changes were not detrimental. Thus, in a sales environment where turnover is likely, assigning goals may help motivate employees to stay focused on effort that leads to performance. This research adds to our understanding of two motivational levers for individual job performance placed in the context of a dynamics inferential lens.

Another interesting finding was that effort contained inertia or self-similarity whereas sales did not. Hence, one may conclude that salespeople exhibit similar patterns in their behavior but sales are less predictable. Although effort predicts concurrent sales after partialling sales inertia from $t - 1$, effort does not by itself yield sales. A salesperson's hard work may not manifest in sales for several reasons. First, effort or "working hard" alone does not encompass "working smart" or sales planning, strategy, and adaptive selling behaviors that have been shown to also affect performance (e.g., Rapp et al., 2006). Moreover, some salespeople may have a greater passion and enthusiasm for the products and services being sold and a stronger customer orientation, both of which may affect their customer encounters differentially than their peers during the time that they are on the phone. Salespeople also may develop greater efficiency in

how they present products, respond to customer objections, or close deals as they gain more experience with the company as well, which our results confirm. Finally, external influences like market turbulence, a competitor lowering their price, or other external events also influence what customers purchase. Our findings thus provide some insight into the long history of outcome versus behavior control for salespeople (e.g., Cravens et al., 1993; Miao & Evans, 2013). Collectively, the findings of the present study suggest that performance is best understood as a collection of closely interrelated processes that increase and decrease in response to changes in system states. This study therefore has both theoretical and practical implications.

*5.1 Theoretical Implications*

Viewing performance as a dynamic system introduces a fresh theoretical perspective to the literature. Sales scholars must consider dynamic models that can account for antecedent- and consequence-based processes that unfold from one episode to the next, which differ from the static content models at the between-persons level, and even within-person studies that examine all effects at the same measurement period. The current study serves as an example of this approach and is one of the first studies to test all principles of a dynamic system. Each principle was combined into a theory that can help organizations appreciate within-person processes operating among their employees. From a systems perspective (Meadows, 2008), the results suggest that the ups and downs in performance are inherent to performance itself and yet responsive to broader effects on the states. Managers work in a world of uncertainty and complexity, so success in contemporary workforces requires an appreciation of the many linkages and interconnectedness between the components that constitute a system. For managers and employees, then, the current research speaks to the necessity for dynamic systems thinking, especially knowing that when leaders isolate and manipulate single aspects without appreciating

the entire system, the effects on performance can be detrimental (Cronin & Gonzalez, 2007; Weinhardt & Vancouver, 2012).

We also advance research on the effects of goals and leadership changes. We extend knowledge related to the theories of self-regulation and uncertainty to consider how goals and leadership changes might operate on employee performance across time at the within-person level. Ultimately, we found that goals but not leadership changes predicted within-person changes in both effort and sales when both are present. For organizations, these findings suggest that – consistent with a dynamic systems view – goals may be an effective tool for motivating effort despite other events such as leadership changes operating simultaneously.

These results also contribute to the derailment literature (Hogan et al., 2010; Skogstad et al., 2007), offering a competing perspective to the notion that leadership changes are harmful. For instance, Hogan et al. (2018) state that leadership changes result in lost intellectual and social capital, damaged reputations, missed business opportunities, and low productivity associated with alienated employees. Our paper counters this line of thinking by suggesting that goals may provide a potentially protective effect, which again broadens the notion to a systems rather than single-effect view. Moreover, most studies of derailment assess costs for the organization as a whole. In a survey of human-resource executives, for example, DeVries & Kaiser (2003) find that the estimated cost of derailment is between $750,000 and $1.5 million per executive. Our paper complements this research by focusing on the effects operating on employees rather than the firm. It is also quite possible that while leadership changes negatively impacted some employees, such changes could have been beneficial for others, particularly if the leader was incompetent, untrustworthy, or unsupportive (e.g., Badrinarayanan, Gupta, & Chaker, 2020). Popular press highlights, “A modest amount of turnover is normal, expected, and can be

healthy. Every company has poor performers, and it's a good idea to bring new people with fresh ideas, different perspectives, capabilities, and attitude that prevents stagnation" (Chaine, 2019). Hence, with some leadership changes being positive and others negative, the overall effect was not significantly different than zero.

*5.2 Practical Implications*

This study offers several takeaways for managers. Since salespeople exhibit self-similarity in effort and effort predicts sales, managers may consider using past effort to forecast future sales, to a degree. Whereas companies often use previous sales to forecast future sales, tracking salesperson effort may be a worthy endeavor for forecasting as well, as sales are less predictable than salesperson behavior. Moreover, because effort may be more within the salesperson control, revisiting compensation plans to include an effort component (rather than incentives for sales alone) may be worthwhile. Importantly, goals do predict effort and sales, so communicating expectations is critically important for firms. In fact, with short-term goals to focus on, salespeople may not be as distracted by other turbulence such as leadership turnover, which brings us to the next takeaway.

Another implication is to understand the effects of leadership changes with respect to the other states in the system and the natural ebb and flow inherent to the structure of performance. Many researchers describe modern jobs and work identities as boundaryless and protean (Direnzo, Greenhaus, & Weer, 2015; Grant & Parker, 2009; Wiernik & Kostal, 2019), meaning that employees (a) expect to move from job to job and experience different workplaces over their career (boundaryless) and (b) view their identity not bounded within a single organization but connected across jobs, time, and life outside of work (protean). To the extent that these ideas align with actual workforce characteristics, it would be reasonable to suspect that at least some

subset of employees experience leadership changes. Leadership change may also be seen as important due to notable research on derailment (Hogan, Hogan & Kaiser 2010; Hogan et al. 2018). This research estimates that the base rate of management failure is anywhere from 30% to 67%, with significant resulting costs to organizations. Whereas past research focuses on the causes of failing managers, our research is a natural next step examining the consequences of leadership changes. Moreover, Hogan et al. (2018) informally suggest that leadership changes produce low productivity. Our paper suggests that considering such an effect in isolation misses the idea that performance is a system with many interconnected sources of influence. Although leadership changes may have negative effects in isolation, it is important to examine whether they sufficiently disturb performance above and beyond (a) the other effects in the system and (b) the natural the ebbs and flows inherent to any complex system.

*5.3 Limitations and Research Directions*

There are several limitations to this study, which could serve as avenues for future research. First, we examined only a single organization and thus our results may not generalize to other sectors, geographic areas, or industries. There also were a number of aspects that were fairly unique to our sample, including, for example, the fact that goals were exogenous to the employees and not based on past performance. Likewise, employees working in different industries outside of the sales domain may not experience such direct and specific information regarding expected performance levels, so although the notion of system dynamics would be the same, the specific shocking effects may differ. Second, we examined only one dimension of behavior performance (effort) and one dimension of outcome performance (sales). Campbell & Wiernik (2015) state that doing so is appropriate for studies examining within-person effects as it would be a large resource burden to collect all performance dimensions across many people for

several time points, but nonetheless there are other dimensions to examine, such as organizational citizenship behaviors, counterproductive behaviors, and network behaviors (among others).

One strength of this study was that all measures were objective, coming not from self-reports but external data sources regarding employee behavior. In one sense, then, the data provide an impartial window into employee actions. However, future research may wish to survey employees and ask for items such as total years of sales experience – not only tenure at their current job but also years worked elsewhere – and employ such measures as controls. Likewise, surveys can help to harness salesperson perceptions of leadership changes or goal attainability that may provide additional insights to the shocks chosen. Perhaps underlying mechanisms exist that conflict and therefore help spur insignificant results of leadership changes on subsequent performance.

## 6. Conclusion

This study attempted to introduce a theory of performance system dynamics. We unpacked inertia, stationarity, feedback, and shocks and situated these principles into a theoretical framework, and then drew from a number of psychological and behavioral theories to specify the forms such relationships would take. Moreover, we examined both assigned goals and leadership changes as core predictors of within-person performance above and beyond their typical states. We examined these ideas among sales employees operating over time and found that performance states changed in response to changes in the system as a whole. Using these results, organizations can better manage and support employee performance by understanding the system of effects at play.

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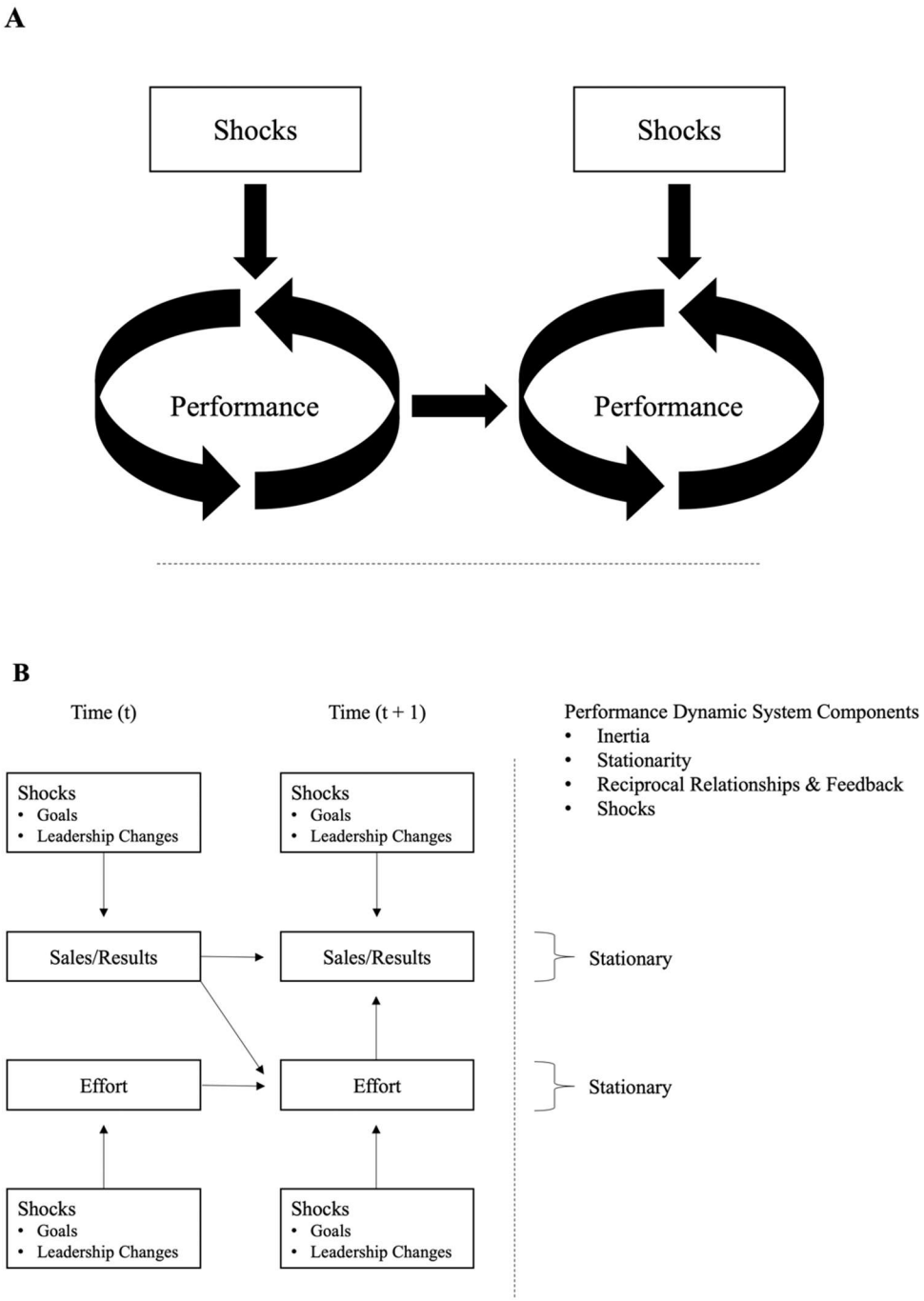
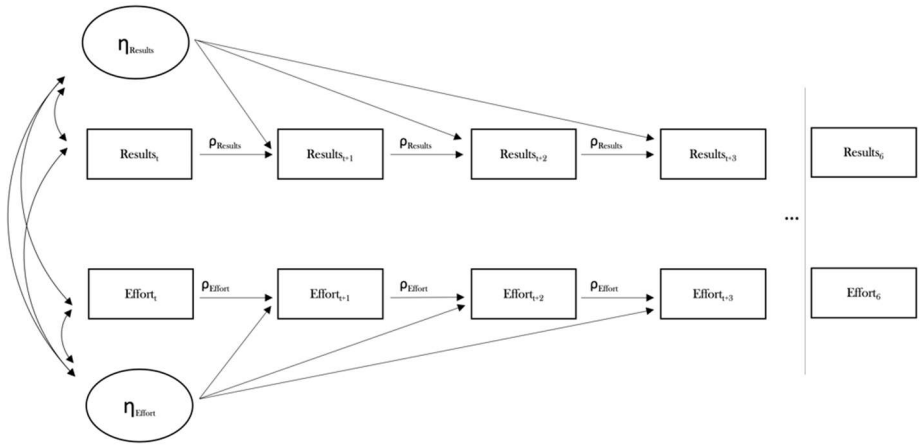
***Figure 1*. Theoretical model of performance as a dynamic system.**



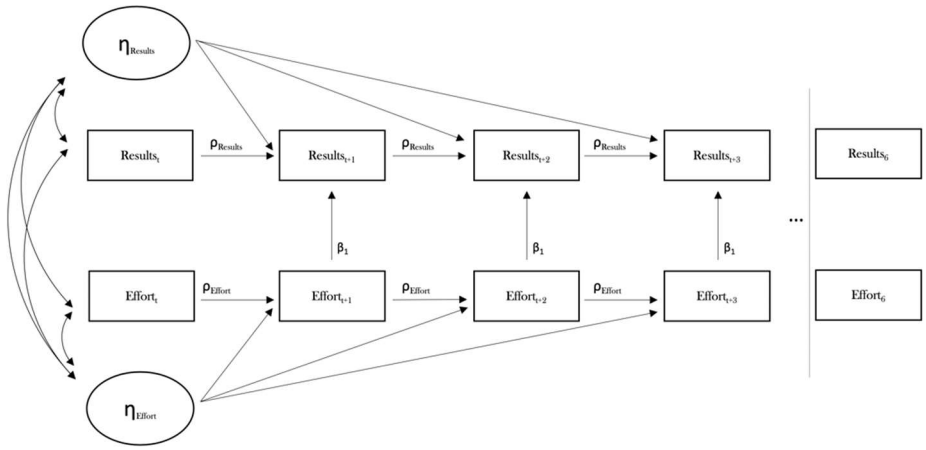

Note: (**A**) Model heuristic. (**B**) Dynamic principles and their representation with respect to performance.

***Figure 2*. Nested dynamic panel models with unobserved heterogeneity for both effort and results/sales.**

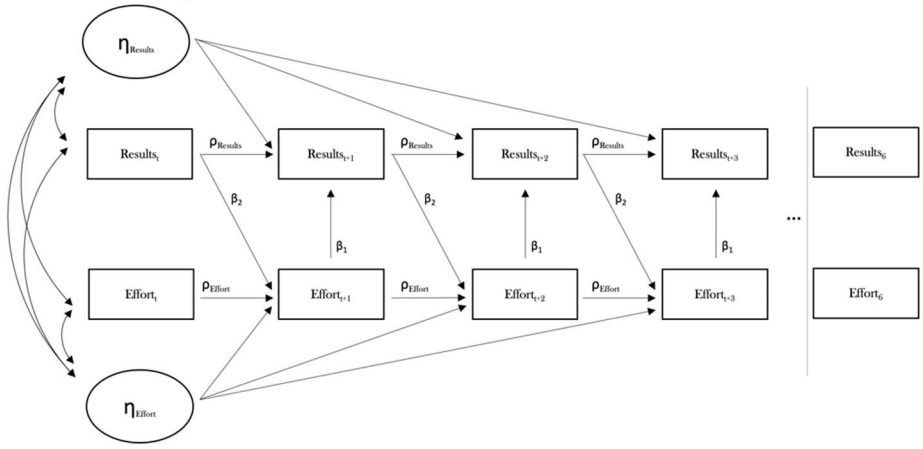
Panel A - Autoregressive




Panel B - Concurrent

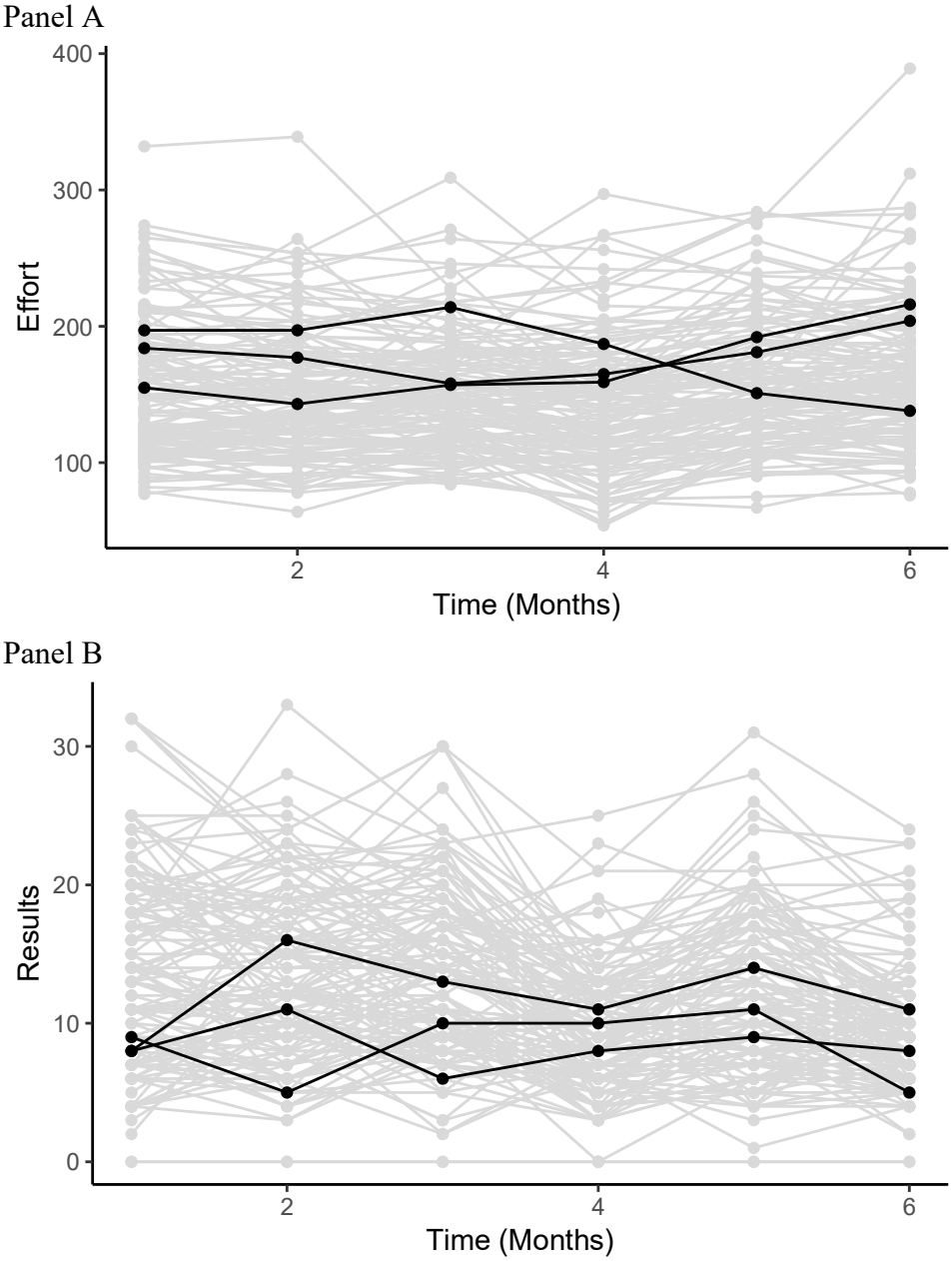



Panel C - Reciprocal




Note: Apart from the freely estimated covariances among the exogenous variables (effort and results/sales at time 1, and both unobserved heterogeneity terms), all unlabeled paths were set to one.

***Figure 3*. Raw trajectories of effort (Panel A) and results/sales (Panel B) across time.**




Note: Three randomly selected individuals are shown in black.

**Table 1**
**Between-person mean (SD) for sales, effort, and goals at each time point.**

| Time | Sales/Results | Effort | Goal | Leadership Change |
|---|---|---|---|---|
| 1 | 13.7 (6.9) | 154.7 (49.3) | 19.6 (15.6) | 0 |
| 2 | 13.3 (6.1) | 150.7 (46.4) | 20.0 (15.6) | 3 |
| 3 | 13.3 (6.1) | 152.1 (41.9) | 19.9 (22.5) | 12 |
| 4 | 9.6 (4.6) | 142.1 (46.8) | 18.6 (24.4) | 15 |
| 5 | 12.0 (5.8) | 159.1 (45.5) | 19.7 (25.7) | 23 |
| 6 | 10.0 (4.6) | 165.2 (50.3) | 18.7 (25.7) | 7 |

Note: The last column indicates the total number of leadership changes at each time point.

**Table 2**
**Correlations (between-person) among effort at every time point.**

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Effort time 1 | 1.0 | | | | | |
| 2. Effort time 2 | 0.88 | 1.0 | | | | |
| 3. Effort time 3 | 0.81 | 0.83 | 1.0 | | | |
| 4. Effort time 4 | 0.82 | 0.81 | 0.79 | 1.0 | | |
| 5. Effort time 5 | 0.78 | 0.79 | 0.80 | 0.84 | 1.0 | |
| 6. Effort time 6 | 0.73 | 0.79 | 0.70 | 0.74 | 0.80 | 1.0 |

Note: All relationships are significant.

**Table 3**
**Correlations (between-person) among sales/results at every time point.**

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Sales time 1 | 1.0 | | | | | |
| 2. Sales time 2 | 0.65 | 1.0 | | | | |
| 3. Sales time 3 | 0.72 | 0.67 | 1.0 | | | |
| 4. Sales time 4 | 0.59 | 0.61 | 0.48 | 1.0 | | |
| 5. Sales time 5 | 0.61 | 0.64 | 0.61 | 0.63 | 1.0 | |
| 6. Sales time 6 | 0.61 | 0.60 | 0.52 | 0.58 | 0.63 | 1.0 |

Note: All relationships are significant.

**Table 4**
**Between person correlations among predictor and outcome variables at a single time point (time 3).**

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Goal | 1.0 | | | | |
| 2. Leader Change | 0.17 | 1.0 | | | |
| 3. Effort | 0.15 | -0.07 | 1.0 | | |
| 4. Sales | -0.07 | -0.13 | 0.21* | 1.0 | |
| 5. Experience | 0.08 | -0.10 | 0.03 | 0.15 | 1.0 |

Note: * = $p < 0.05$. Biserial correlations were used for leader change (dichotomous) and the other variables.

**Table 5**
**Average (SD) within person correlation among predictor and outcome variables.**

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1. Goal | 1.0 | | | |
| 2. Leader Change | -0.30 (0.55) | 1.0 | | |
| 3. Effort | 0.07 (0.44) | 0.02 (0.56) | 1.0 | |
| 4. Sales | 0.33 (0.47) | -0.27 (0.54) | 0.24 (0.42) | 1.0 |

Note: Biserial correlations were used for leader change (dichotomous) and the other variables. No significance tests shown because these numbers represent the mean (SD) of the distribution of within person correlations.

**Table 6**
**Nested Model Comparisons**

| **Dynamic Panel Models** | **AIC** | **BIC** | ***df*** | $\chi^2$ | $\Delta df$ | $\Delta\chi^2$ |
|---|---|---|---|---|---|---|
| Reciprocal | 12142 | 12212 | 54 | 97.1 | | |
| Concurrent | 12141 | 12207 | 55 | 97.9 | 1 | 0.8 |
| Independent | 12165 | 12229 | 56 | 124.0 | 1 | 26.1* |

Note: * = $p < 0.05$. Change columns and significance tests represent reciprocal compared to concurrent (concurrent retained) and then concurrent compared to independent (concurrent retained).

**Table 7**
**Model Results**

| | |
|---|---|
| $Effort_t \sim$ | |
| 1. $Effort_{t-1}$ | 0.30 (0.06)* |
| 2. $Goal_t$ | 0.35 (0.14)* |
| 3. Leadership $Change_t$ | 2.93 (3.38) |
| 4. Experience | 0.03 (0.01)* |
| $Sales_t \sim$ | |
| 1. $Sales_{t-1}$ | 0.002 (0.04) |
| 2. $Effort_t$ | 0.03 (0.01)* |
| 3. $Goal_t$ | 0.07 (0.02)* |
| 4. Leadership $Change_t$ | -0.49 (0.52) |
| 5. Experience | 0.03 (0.01)* |

Note: * = $p < 0.05$.

## Table 8
## Summary of Hypotheses Testing Results

| Hypotheses | Direction of H | Result | Support for H |
|---|---|---|---|
| $H_1$: Within-person sales at time *t* will positively relate to sales at time *t + 1*. | + | + | No |
| $H_2$: Within-person effort at time *t* will positively relate to effort at time *t + 1*. | + | + | Yes |
| $H_3$: Sales/Results will be stationary. | | | Yes |
| $H_4$: Effort will be stationary. | | | Yes |
| $H_5$: Within-persons, effort at time *t* positively relates to sales at time *t*. | + | + | Yes |
| $H_6$: Within-persons, sales at time t negatively relates to effort at time *t + 1*. | - | - | No |
| $H_7$: Within-salespersons, leadership changes at time *t* negatively relate to effort at time *t*. | - | + | No |
| $H_8$: Within-salespersons, leadership changes at time *t* negatively relate to sales performance at time *t*. | - | - | No |
| $H_9$: Within-persons, goals at time *t* positively relate to effort at time *t*. | + | + | Yes |
| $H_{10}$: Within-persons, goals at time *t* positively relate to sales performance at time *t*. | + | + | Yes |

**A Dynamic System of Job Performance with Goals and Leadership Changes as Shocks**

## Author Biographies

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