Goal Progress Velocity as a Determinant of Shortcut Behaviors

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Abstract

Employees often have a great deal of work to accomplish within stringent deadlines. Therefore, employees may engage in *shortcut behaviors*, which involve eschewing standard procedures during goal pursuit to save time. However, shortcuts can lead to negative consequences such as poor-quality work, accidents, and even large-scale disasters. Despite these implications, few studies have investigated the antecedents of shortcut behaviors. In this research, we propose that employees engage in shortcut behaviors to regulate their *velocity* (i.e., rate of progress). Specifically, we predict that when individuals experience slower-than-referent velocity, they will (1) believe that the goal is unlikely to be met via standard procedures (2) and experience feelings of frustration. In turn, we expect these psychological states to be related to the perceived utility of shortcuts, especially when shortcuts are perceived as viable means to achieve the goal. Finally, we predict that the perceived utility of shortcuts will be positively related to actual shortcut behaviors. We tested these predictions using a laboratory experiment in which we manipulated velocity and unobtrusively observed shortcuts (Study 1, $N = 147$), as well as a daily diary study in which employees reported their velocity and shortcut behaviors over five consecutive workdays (Study 2, $N = 395$). Both studies provided support for our predictions. In sum, this research provides evidence to suggest that the experience of slow progress can lead to shortcuts not only by casting doubt on employees' perceived likelihood of meeting the goal, but also by producing feelings of frustration.

Keywords: shortcut behaviors, velocity, expectancy, frustration, utility

Employees sometimes have too much work to accomplish, and as such, use shortcuts to save time (Hannah & Robertson, 2015; Parks et al., 2010). *Shortcut behaviors* (SCBs) are defined as "the use of methods or means for completing a task that require less time than typical or standard procedures" (Beck, Scholer, & Schmidt, 2017, p. 422). Although shortcuts save time, they often involve skipping steps that are in place to ensure safety and quality (Parks et al., 2010; Sekerka & Zolin, 2007). Thus, shortcuts can lead to undesirable outcomes for employees, organizations, and the public in general. For instance, restaurant employees may skip proper handwashing procedures to save time, yet doing so is a major cause of the spread of foodborne illnesses (Green et al., 2007). Likewise, seemingly mundane shortcuts, such as sharing passwords with others to save time, threaten organizational information security (Vance et al., 2012). Finally, SCBs have also been identified as a factor contributing to several large-scale accidents, including the crash of ValuJet 592 over the Florida Everglades (National Transportation Safety Board, 1997) and the explosion of the Deepwater Horizon oil platform in the Gulf of Mexico (Reader & O'Connor, 2014). Therefore, preventing such negative outcomes requires a thorough understanding of the antecedents of SCBs.

To this end, we draw on theories of self-regulation (e.g., Lord et al., 2010; Neal et al., 2017) to argue that individuals use SCBs to regulate velocity during goal pursuit. *Velocity* is defined as an individual's perceived rate of progress towards a goal (Carver & Scheier, 1990). A growing body of theory and research indicates that whereas rapid progress is generally met with optimism and positive emotions, slow progress typically results in more pessimistic beliefs and negative emotions (Johnson et al., 2013). Importantly, a defining feature of SCBs is that they allow work to be accomplished more *rapidly* compared to standard procedures. Thus, we predict that individuals may turn to SCBs in response to slow velocity.

We tested our hypotheses across two complementary studies. Study 1 was an experiment in which we manipulated velocity while participants completed a simulated work task, and Study 2 was a diary study in which we measured velocity and SCBs daily over five days among a sample of employees working across a wide range of occupations. In doing so, this research makes several theoretical and practical contributions. First, despite their implications for work quality and safety, SCBs have received little research attention. We address this gap by demonstrating that individuals engage in SCBs when experiencing slower-than-desired velocity. Second, we expand on past research within the velocity literature by identifying SCBs as behavioral outcomes resulting from slow velocity. Although a great deal of research has investigated velocity's impact on individuals' thoughts and feelings during goal pursuit (Johnson et al., 2013), the effects of velocity on behavior remain largely unexplored. Finally, we identify multiple pathways via which velocity is likely to influence SCBs, and in doing so, highlight the fact that curbing SCBs in the workplace will likely require consideration of both cognitive *and* emotional reactions to slow velocity. Our predictions are summarized in Figure 1.

Shortcut Behaviors as Means of Goal Pursuit

Individuals pursue work goals by engaging in job-relevant behaviors (Campbell & Wiernik, 2015). These behaviors are often standardized, as deviating from standard procedures can increase the likelihood of accidents, injuries, mistakes, and other negative outcomes (e.g., Halbesleben, 2010; Reader & O'Connor, 2014). Nonetheless, there are often multiple behavioral means that can be used to pursue a given goal (Kruglanski et al., 2015). That is, even if there are ways of performing a work task "by the book," employees can sometimes take shortcuts around these standardized procedures. To this end, a body of research has begun to identify antecedents of using SCBs to pursue work goals.

Some studies have identified individual differences as predictors of SCBs. For instance, conscientiousness and proactive personality are negatively related to the use of SCBs, and the dark triad personality traits Machiavellianism and psychopathy are associated with increased use of SCBs (Jonason & O'Connor, 2017; Yan et al., 2021). Although this research is important for identifying *who* is most likely to engage in SCBs, it is also critically important to understand *when* individuals are most likely to use SCBs to pursue their work goals. That is, although some employees engage in more SCBs *on average* relative to their peers, even the most diligent and well-meaning employees are likely to engage in SCBs on occasion. Accordingly, other research has identified situational antecedents of SCBs. For instance, Halbesleben (2010) found that exhaustion predicted SCBs among healthcare professionals. Likewise, Dai et al. (2015) found that adherence to hand hygiene procedures among hospital workers diminished over the course of the workday. This previous research provides important insights into the reasons individuals eschew standard work procedures in favor of shortcuts, yet we argue that this work has overlooked a critical feature of SCBs. Specifically, SCBs allow individuals to accomplish tasks *more rapidly* than they otherwise would.

For instance, there are qualitative studies which suggest that employees engage in SCBs to expedite work progress (Hannah & Robertson, 2015; Sekerka & Zolin, 2007). Similarly, there is evidence that individuals use SCBs to manage large workloads within stringent deadlines. Specifically, Beck, Scholer, and Schmidt (2017) had participants perform repeated trials of an air traffic control simulation in which SCBs were operationalized as the decision to send aircraft outside prescribed flight paths. Doing so saved time and allowed participants to land more aircraft within the deadline. Yet, SCBs could result in "near misses," which carried financial penalties. Beck et al. found that during trials when there was a large number of aircraft to land

(i.e., high workload), participants perceived shortcuts as more useful (i.e., to have high utility), relative to trials when fewer aircraft need to be landed. In turn, utility perceptions predicted the degree to which participants actually engaged in SCBs.

Importantly, in Beck, Scholer, and Schmidt's (2017) study the deadline remained constant across trials, meaning high workloads created a need for individuals to work *rapidly*. Thus, these results provide indirect evidence that individuals use SCBs to regulate velocity during goal pursuit. In the current research we consider this issue more directly. Specifically, we argue that velocity is a key driver of utility perceptions, such that SCBs will be considered most useful when velocity is slow. Downstream, utility perceptions tend to guide decision-making (Van Eerde & Thierry, 1996). As such, we expect to replicate Beck et al.'s finding that utility perceptions are a proximal predictor of SCBs.

H1: Utility perceptions will be positively related to SCBs.

Velocity as a Determinant of the Utility of Engaging in SCBs

When faced with a problem, individuals often use the first available satisfactory solution, rather than continuing to search for an optimal solution (e.g., Simon, 1990). Along these lines, rather than considering all possible ways a work task might be completed, in most cases we expect individuals to use standard procedures. Indeed, work procedures become standardized precisely *because* they are practical, efficient, safe, and otherwise useful for completing a work task under most conditions. Thus, as long as standardized procedures are sufficient for completing the task at hand, individuals are likely to use these procedures. Yet, the purpose of this research is to understand instances when standard work procedures are *not* satisfactory. In particular, we argue that a slow rate of progress is a signal that standard procedures are

insufficient. As such, we expect the perceived utility of SCBs to increase in response to slow velocity. This prediction is derived from self-regulatory theories of goal pursuit.

The central principle of these theories is that motivation stems from the desire to reduce discrepancies between goals and one's current level of performance (e.g., Carver & Scheier, 1990, 1998; Lord et al., 2010). Importantly, goals are rarely achieved instantaneously, but instead are pursued over time. To this end, Carver and Scheier theorized that individuals regulate not only the *amount* of progress remaining to be made, but also the *rate* at which progress is made (i.e., velocity). In particular, these authors proposed that individuals regulate velocity against an internal referent, which represents a desired or satisfactory rate of progress. More so, Carver and Scheier postulated that even after accounting for discrepancies between the amount of goal progress made and the amount of progress remaining, faster-than-referent progress results in optimism and positive emotions, whereas slower-than-referent progress leads to pessimism and negative emotions. Empirical research has supported these propositions (Johnson et al., 2013), yet as noted above, behavioral outcomes associated with velocity have been largely overlooked. We consider the use of SCBs as one such behavior.

In particular, we argue that velocity influences the perceived utility of SCBs. We draw on previous research to argue that velocity affects utility via two distinct pathways. First, slower-than-referent velocity signals that the goal may not be met on time (e.g., Chang et al., 2010). As such, slow velocity is likely to trigger a rational, strategic process whereby individuals recognize a need to change their goal pursuit strategy. Second, experiencing slower-than-referent velocity is unpleasant (e.g., Beck, Scholer, & Hughes, 2017). Therefore, individuals may perceive SCBs to have high utility because SCBs can increase velocity, thereby alleviating negative emotions.

We consider both the strategic and emotional pathways from velocity to utility in more depth in the following sections.

The Strategic Pathway: Is Faster Velocity Needed to Reach the Goal on Time?

When determining whether or not to engage in SCBs, we expect individuals to consider the necessity of doing so. In particular, we argue that the velocity experienced during goal pursuit will influence expectancy of goal success, which is defined as a person's perceived likelihood that a goal will be met within the deadline (e.g., Sun et al., 2014; Vancouver et al., 2010). Whereas rapid progress suggests that the goal is likely to be met by the deadline, slow progress may raise doubts that the goal can be accomplished on time (Carver & Scheier, 1990, 1998). Indeed, several empirical studies have linked velocity to expectancy. For example, Chang et al. (2010) manipulated velocity while participants performed a verbal task and found that fast velocity led to higher expectancy than slow velocity. Similarly, Huang and Zhang (2011) observed positive relationships between velocity and expectancy across various tasks. Downstream, we predict that expectancy will affect the perceived utility of engaging in SCBs.

However, additional nuance is warranted. Because by definition SCBs result in faster progress than standard procedures, we differentiate expectancy of success using only standard procedures (expectancy-SOP) from expectancy if SCBs are used (expectancy-SCB). We suggest that individuals use expectancy-SOP perceptions to determine the degree to which standard work procedures are sufficient for meeting the goal. Whereas high expectancy-SOP indicates that the goal is likely to be met within the deadline using standard procedures, low expectancy-SOP signals that an alternative approach to goal pursuit is warranted. Based on the findings from previous research reviewed above (Chang et al., 2010; Huang & Zhang, 2011), we expect velocity to be positively related to expectancy-SOP. Downstream, expectancy-SOP is expected

to be negatively related to utility perceptions. That is, SCBs are expected to be perceived as most useful when there is a strong need to deviate from standard procedures. Conversely, when standard procedures are sufficient for meeting the goal on time, the perceived utility of engaging in SCBs is likely to be relatively low.

Yet, in addition to expectancy-SOP, the perceived utility of SCBs may also depend on expectancy-SCB. Formally, we predict that expectancy-SCB will moderate the effect of expectancy-SOP on utility. In particular, we expect utility be highest when standard procedures are not perceived to be viable means of goal pursuit (i.e., expectancy-SOP is *low*), and SCBs are seen as a viable alternative (i.e., expectancy-SCB is *high*). When expectancy-SCB is low, the perceived utility of engaging in SCBs is likely to be relatively low, regardless of expectancy-SOP. This is because there are potential downsides to engaging in SCBs (e.g., low quality work, accidents). If the goal is unlikely to be achieved on time even if SCBs are used (as indicated by low expectancy-SCB), then the potential downsides of SCBs outweigh the benefits (i.e., faster velocity). Yet, when expectancy-SCB is high, we expect to observe a strong negative relationship between expectancy-SOP and utility. This is because low expectancy-*SOP* signals a need to change strategies, and high expectancy-*SCB* indicates that SCBs are a viable alternative to standard procedures.

> *H2a*: Velocity will be positively related to expectancy-SOP.

> *H2b*: Expectancy-SOP will be negatively related to utility. This relationship will be moderated by expectancy-SCB, such that expectancy-SOP will be more strongly negatively related to utility when expectancy-SCB is high, relative to when expectancy-SCB is low.

> *H2c*: There will be a negative indirect effect of velocity on utility via expectancy-SOP. This effect will be moderated by expectancy-SCB, such that this indirect effect will be stronger when expectancy-SCB is high, relative to when expectancy-SCB is low.

Furthermore, integrating these hypotheses with H1 yields the following:

H2d: There will be a negative serial indirect effect of velocity on SCBs via expectancy-SOP and utility on SCBs. This effect will be moderated by expectancy-SCB, such that this indirect effect will be stronger when expectancy-SCB is high, relative to when expectancy-SCB is low.

Up to this point we have described a largely rational process via which utility perceptions are formed. We argued that individuals first determine whether or not it is necessary to increase velocity, and then consider whether SCBs are viable means of doing so. In the following section we argue that perceptions regarding the utility of engaging in SCBs are also driven by emotions, above and beyond the cognitive process described above.

The Emotional Pathway: Slow Progress is Frustrating

Carver and Scheier (1990, 1998) argued that experiencing slower-than-referent velocity is emotionally unpleasant, and several studies have linked slow velocity to dissatisfaction and negative emotions (Beck, Scholer, & Hughes, 2017; Chang et al., 2010; Elicker et al., 2010; Lawrence et al., 2002; Phan & Beck, 2020; Wilt et al., 2017). Prior research suggests that frustration is a particularly relevant emotion linking velocity and SCBs. Frustration is characterized by annoyance, irritation, and exasperation (Spector, 1978). Importantly, frustration is often experienced in response to obstacles and impediments during goal pursuit (Audirac, 2008; Fox & Spector, 1999; Roseman et al., 1994). Slow velocity is one such impediment. For instance, across two studies Beck, Scholer, and Hughes found slower-than-referent velocity to cause elevated frustration. In these studies, participants' likelihood of meeting the goal was held constant across experimental conditions, meaning slow velocity led to frustration *above and beyond* the objective implications of velocity for meeting the goal. As such, we expect velocity to be negatively related to frustration, even after controlling for expectancy-SOP.

Downstream, we expect frustration to be positively related to the perceived utility of engaging in SCBs. Similar to expectancy-SOP, we argue that frustration reflects the degree to

which standard work procedures are satisfactory means of goal pursuit. Indeed, there is evidence

that individuals use emotions as signals regarding goal progress (Richard & Diefendorff, 2011).

Because frustration is aversive and unpleasant, individuals are motivated to remove sources of

frustration (Berkowitz, 1989; Berkowitz & Harmon-Jones, 2004; Folkman & Lazarus, 1980).

When slow velocity is the source of frustration, there is an incentive to increase velocity in the

future. Therefore, we predict a positive relationship between frustration and the perceived utility

of engaging in SCBs.

However, similar to expectancy-SOP, we expect the relationship between frustration and

utility to be moderated by expectancy-SCB. If the velocity that can be achieved via SCBs is still

too slow to meet the goal on time (i.e., low expectancy-SCB), then SCBs are likely to hold little

utility, regardless of the level of frustration. Yet, when SCBs are perceived to be viable means of

goal pursuit (i.e., high expectancy-SCB), we expect to observe a strong positive relationship

between frustration and utility. That is, we predict that utility will be highest when both

frustration *and* expectancy-SCB are relatively high.

H3a: Velocity will be negatively related to frustration.

H3b: Frustration will be positively related to utility. This relationship will be moderated by expectancy-SCB, such that frustration will be more strongly related to utility when expectancy-SCB is high, relative to when expectancy-SCB is low.

H3c: There will be a negative indirect effect of velocity on utility via frustration. This effect will be moderated by expectancy-SCB, such that this indirect effect will be stronger when expectancy-SCB is high, relative to when expectancy-SCB is low.

Finally, as was the case above, integrating these hypotheses with H1 yields the following:

H3d: There will be a negative serial indirect effect of velocity on SCBs via frustration and utility on SCBs. This effect will be moderated by expectancy-SCB, such that this indirect effect will be stronger when expectancy-SCB is high, relative to when expectancy-SCB is low.

Overview of Studies

We tested our hypotheses across two studies. In line with our self-regulatory theoretical framework, both studies used within-person designs. That is, these studies assessed the degree to which SCBs are used to counteract slower-than-referent velocity while pursuing work goals. Study 1 was a laboratory experiment in which participants completed a work simulation. Velocity was manipulated at the within-person level of analysis and participants' actual SCBs were unobtrusively observed. Thus, Study 1 provides an internally valid test of our hypotheses by allowing us to determine whether within-person variation in velocity can *cause* changes in SCBs. Conversely, Study 2 was a daily diary study in which employees reported their velocity and SCBs over multiple workdays. This study assesses the degree to which the processes observed in Study 1 generalize to natural work settings.

Study 1

Method

Study 1 was reviewed and approved by the University of Waterloo's Office of Research Ethics (ORE Approval #31254, "Expense Report Study").

Transparency and Openness

For both studies, we describe our sampling plan, all data exclusions (if any), all manipulations, and all measures used, and we adhered to the Journal of Applied Psychology methodological checklist. We tested our proposed model across both studies using Mplus version 6.12 (Muthén & Muthén, 2010) and used R version 4.0.4 (R Core Team, 2021) for all other analyses. The hypotheses and analysis plan for Study 2 (but not Study 1) were preregistered. Data, analysis code, and research materials for both studies, as well as preregistration materials Study 2 are available at https://osf.io/3b8wx/.

Participants

Undergraduate students at a Canadian university ($N = 147$) participated in a laboratory study in exchange for course credit and an opportunity to earn a cash prize (described below). The sample was 82% female and had a mean age of 19.90 years ($SD = 2.02$). Most participants identified as Asian (38%) or White/Caucasian (27%).

Procedure

Participants completed five blocks of a work simulation task individually at a computer station during a 45-minute laboratory session. Velocity was manipulated following each block. The study used a within-subjects design, such that all participants saw all three levels of the velocity manipulation (i.e., slow, average, and fast) during the study. In addition, participants reported expectancy-SOP, expectancy-SCB, frustration, and utility prior to starting each block. SCBs were recorded automatically by the task.

Experimental Task. Participants assumed the role of an employee at an event-planning company. The task consisted of 5 blocks of 10 trials each. During each trial, participants were to retrieve the pre-tax cost of one past event, which was stored in a database. This was done by clicking a button on the computer screen, after which the pre-tax cost was displayed. After retrieving the pre-tax cost, participants calculated the event's *total cost* by adding a 5% sales tax using a hand-held calculator. Finally, participants entered the total cost into a text box, thereby completing the trial. Therefore, the rules of the task were simple to learn and required no special knowledge or skills. Performance on the task was computed as a function of the speed and accuracy with which participants completed the trials; this scoring is described in more detail in the "Incentives" section. A screenshot of the task is shown in Figure 2.

SCB. During each trial, participants had the option to use either a "central database" (i.e., the standard procedure) or a "local database" (i.e., the shortcut) to retrieve the pre-tax event cost.

Participants were told that using the central database was the standard procedure for performing

the task, as 100% of the pre-tax values stored in the central database were accurate. However,

because the central database was ostensibly located in a different location, there would be a four

second delay between the moment the button was clicked and the moment the cost appeared.

Thus, following these initial instructions, participants were introduced to a shortcut that could be

used to increase their rate of progress.

Specifically, participants were told that instead of using the central database to retrieve

the pre-tax values, they could use a local database. Because the information in the local database

was ostensibly stored on-site, the pre-tax cost would appear instantaneously after the button was

clicked (i.e., there was no delay). However, using the local database (i.e., SCBs) was associated

with the risk of submitting an incorrect total cost, as some of the pre-tax values in the local

database were out of date and therefore inaccurate. In actuality 10% of the pre-tax values in the

local database were inaccurate. Importantly, participants were not told the exact rate of

inaccuracy; they were only told that *some* of the pre-tax values in the local database were

inaccurate. To enhance the realism of the experiment, the possibility of using the local database

was introduced via a message from a "coworker."

Incentives. To incentivize performance, participants had the opportunity to earn a bonus

cash prize of up to $5.00. We designed the bonus structure to reflect the positive outcomes (i.e.,

faster progress) and negative outcomes (i.e., inaccuracy) associated with SCBs. Specifically,

participants began each block with $1.00, and the amount of money participants retained by the

end of the block was based on the *speed* and *accuracy* with which they performed the task. With

regards to speed, participants were allotted 2 minutes and 50 seconds to complete each block[1].

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[1] The amount of time allotted was based on a pilot study in which participants ($N = 100$) were asked to complete 10
trials of the task as rapidly as possible. Based on the results, we concluded that 2 minutes and 50 seconds would

Two cents ($0.02) were deducted from participants' bonus pay for each second that they spent beyond the allotted time. Notably, there was a significant negative within-person correlation between the usage of SCBs and the amount of time required to complete a block ($r = -.31$, $p < .001$), indicating that SCBs did allow participants to complete the task more rapidly.

    With regards to accuracy, participants lost ten cents ($0.10) for each trial in which the total cost submitted was incorrect. Given the simplicity of the task, incorrect submissions were largely driven by SCBs. Indeed, there was a significant within-person correlation between the number of SCBs performed and the number of incorrect submissions made ($r = .47$, $p < .001$). Participants only received feedback regarding their performance and bonus payments at the end of the study, rather than after completing each individual block. This was done because the effects of SCBs are often not immediately apparent, yet being told that using SCBs has resulted in a negative outcome can have strong effects on subsequent SCBs (Beck, Scholer, & Schmidt, 2017). On average, participants earned $4.15 ($SD$ = $0.95) across the five blocks.

    Velocity Manipulation. Velocity was manipulated as a within-subjects variable, such that all participants were exposed to all three levels of the velocity manipulation (slow, average, and fast). Following each block participants were shown a feedback message regarding their velocity (e.g., "Your rate of progress on the batch you just completed was AVERAGE"). The word "AVERAGE" was replaced by "SLOW" and "FAST" for the slow and fast velocity messages, respectively. By conveying rate of progress relative to the average, we manipulated participants' perceived velocity relative to a normative referent. A great deal of research indicates that individuals are sensitive to their standing relative to social norms (e.g., Cialdini et al., 2006; Goldstein et al. 2008). Moreover, normative referents have successfully been used to

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represent a scarce, but sufficient, amount of time to complete 10 trials using the standard procedure (i.e., the central database). Approximately 30% of participants in the pilot study completed the 10 trials in 2 minutes and 50 seconds.

manipulate velocity perceptions in previous experimental studies (Chang et al., 2010, S2; Huang

& Zhang, 2011, S2-S4). To emphasize the manipulation, each message was accompanied by an

image of a speedometer (Figure 3). The "slow" and "fast" messages were shown once each, and

the "average" message was shown twice.[2] Although participants were led to believe that the

feedback was based on their performance, the order of these messages was randomized.

Measures

Participants completed self-report measures after receiving velocity feedback and prior to

starting a new block. The expectancy and utility measures asked participants about their

perceptions regarding the upcoming block. Although the experiment included five blocks, only

measures following blocks 1-4 were included in the analyses as these measures followed the

velocity manipulation *and* preceded a performance block.

Expectancy-SOP. Expectancy-SOP was assessed with the item "What do you think is

the probability that you will complete all 10 event files within the time available, if you DO NOT

use the Local database?" Participants rated the items on a 0% to 100% scale in increments of 1%.

The following anchors were provided with the scale: "0% = No chance you will complete all 10

event files," "50% = 50/50 chance you will complete all 10 event files," and "100% = You will

definitely complete all 10 event files."

Expectancy-SCB. Expectancy-SCB was assessed with the item "What do you think is

the probability that you will complete all 10 event files within the time available, if you use the

Local database (i.e., the shortcut)?" The same 0% to 100% scale described above was used.

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[2] All participants were also shown the "average" message following the fifth and final block. However, because the
experiment was concluded at this point, no measures were taken and there were no further opportunities to engage in
SCBs. Thus, the velocity feedback shown following the fifth block was not considered within our analyses.

Frustration. Frustration was measured using Peters et al.'s (1980) three-item scale, which we adapted for this study. A sample item is "Working on this task is a very frustrating experience." Participants responded to the items on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). The average Cronbach's alpha reliability across the four blocks was .95.

Utility. Utility was measured using two items that were adapted from Beck, Scholer, and Schmidt (2017). The items were: "Using the local database will pay off during the next batch of event files" and "Using the local database will help me earn more money during the next batch of event files." Participants responded on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). The average Spearman-Brown corrected (*n* = 2) reliability across the four blocks was .86.

SCBs. SCBs were operationalized as the number of times participants clicked on the button associated with the local database. This was automatically recorded by the task.

Perceived Time Available. As a manipulation check, we measured perceived time available to complete the upcoming block. Phan and Beck (2020) found that independent of the *objective* amount of time available to complete a task, individuals *perceived* more time available following fast velocity feedback, relative to slow velocity feedback. As such, relative to the "average" velocity trials, we expected individuals to subjectively perceive more time available following the "fast" velocity trials, and to subjectively perceive less time available following the "slow" velocity trials. Perceived time available was measured using three items from Phan and Beck's second study, which were adapted for the current study. The items were "I will have a great deal of time available to work on the task," "There will be a lot of time available for the task" (1 = *strongly disagree*, 7 = *strongly agree*) and "In your opinion, how much time do you think you will have to complete the task?" (1 = *a very small amount of time*, 7 = *a very large amount of time*). The mean Cronbach's alpha reliability across the four blocks was .88.

Analysis Plan

Because observations were nested within individuals, we tested our hypotheses using

multilevel structural equation modeling (MSEM; Preacher et al., 2010). Although conventional

multilevel modeling (MLM) would also account for the nested nature of the data, a key

advantage of MSEM over MLM is that it allows models to be tested in their entirety, rather than

in piecemeal fashion (e.g., Kline, 2015; Preacher et al., 2016)[3]. Given that Study 1 included an

experimental manipulation (velocity), single-item indicators of relevant constructs (Expectancy-

SOP and Expectancy-SCB), and a directly observed behavioral variable (SCBs), we modeled

relationships between observed variables, rather than latent constructs. The frustration and utility

variables were computed by averaging item responses to create composite indicators.

Because we were interested in testing within-person relationships, all variables were

person-mean centered to remove between-person variance (Hofmann & Gavin, 1998). All R^2

values reported refer to the proportion of within-person variance accounted for by the model.

The velocity manipulation was represented in our analyses using a *slow velocity* dummy variable

(1 = slow, 0 = average, 0 = fast) and a *fast velocity* dummy variable (0 = slow, 0 = average, 1 =

fast). Both expectancy measures (SOP and SCB) were rescaled from 0-100 to a 0-10 scale to

facilitate interpretation of the coefficients.

We specified a model in which (1) expectancy-SOP and frustration were regressed on

both velocity dummy variables, (2) utility was regressed on expectancy-SOP, frustration,

expectancy-SCB, the expectancy-SOP × expectancy-SCB interaction, and the frustration ×

expectancy-SCB interaction, and (3) SCB was regressed on utility. We also specified several

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[3] We also tested the hypotheses using conventional MLM. These analyses are summarized in the supplemental
online materials. Importantly, neither the pattern nor the interpretation of the results changes when analyzing the
data using MLM instead of MSEM.

covariances. First, expectancy-SOP and frustration were allowed to covary because we sought to estimate the effects of velocity on frustration independent of expectancy-SOP, as well as the effects of velocity on expectancy-SOP independent of frustration. Second, expectancy-SOP and expectancy-SCB were allowed to covary, as both are expectancy variables. Third, the interaction terms were allowed to covary with their constituents (e.g., the expectancy-SOP $\times$ expectancy-SCB interaction covarying with expectancy-SOP and expectancy-SCB). Fourth, both interaction terms were allowed to covary, as both interaction terms are a function of expectancy-SCB. Significant interactions were probed using simple slopes analyses (Cohen et al., 2003).

Next, we tested the hypothesized indirect effects using Monte Carlo simulations (Bauer et al., 2006; Preacher & Selig, 2012). Specifically, we generated a normal distribution ($N = 10,000$) for each individual pathway comprising the indirect effect (e.g., velocity → expectancy-SOP and expectancy-SOP → utility) using the regression coefficient and standard error associated with that pathway. Because we predicted moderated indirect effects, we calculated indirect effects of velocity on utility and SCBs at both *low* (-1 SD) and *high* (+1 SD) levels of expectancy-SCB. This was done using the simple slopes obtained from tests of H2b and H3b. Similarly, because relationships between velocity and the mediators were tested with two velocity dummy variables, for each indirect effect hypothesis we calculated the indirect effect of both *slow* velocity and *fast* velocity on utility and SCBs. Next, we computed the product of these distributions to generate a distribution of each indirect effect, where the lower bound and upper bound of the 95% confidence interval respectively correspond to the 2.5th and the 97.5th percentile of the distribution (MacKinnon et al., 2004, 2007). An advantage of this method is that it accounts for the fact that indirect effect distributions tend to be asymmetrical (MacKinnon et al., 2002). Indirect effects were considered significant if the 95% confidence interval excluded zero.

Results

Manipulation Check

As a test of our manipulation, we regressed perceived time available on the velocity manipulation using MLM. As anticipated, the velocity manipulation was significantly related to perceived time available ($F(2, 439) = 67.03$, $p < .001$, $R^2 = .05$). Specifically, relative to the average velocity blocks, participants perceived less time available following slow velocity feedback ($\gamma = -.51$, $SE = .06$, $p < .001$) and more time available following fast velocity feedback ($\gamma = .28$, $SE = .06$, $p < .001$). Thus, the velocity manipulation functioned as intended.

Descriptive Statistics

Means, standard deviations, intercorrelations, and intra-class correlations (ICC[1]) are presented in Table 1. Below we provide complete tests of our hypotheses using MSEM.

Hypothesis Tests

Results are summarized in Table 2. The proposed model provided acceptable fit to the data ($\chi^2 = 48.563$, df =18, $p < .001$, CFI =.920, RMSEA = .054, SRMR = .045).

Hypothesis 1. In support of H1, utility perceptions were positively related to SCBs ($\gamma = .65$, $SE = .10$, $p < .001$).

Hypothesis 2. In support of H2a, relative to average velocity, slow velocity decreased expectancy-SOP ($\gamma = -.28$, $SE = .09$, $p = .001$), whereas fast velocity increased expectancy-SOP ($\gamma = .22$, $SE = .09$, $p = .011$). That is, participants' perceived likelihood of meeting their goals by using standard procedures *decreased* following slower-than-average velocity feedback and *increased* following faster-than-average velocity feedback.

H2b predicted a negative relationship between expectancy-SOP and utility, and that this relationship would be moderated by expectancy-SCB. Although there was a negative main effect

of expectancy-SOP on utility ($\gamma = -.10$, $SE = .03$, $p < .001$), the expectancy-SOP $\times$ expectancy-SCB interaction was not significant ($\gamma = -.02$, $SE = .02$, $p = .329$, $\Delta R^2 = .002$). Therefore, H2b was not supported. Furthermore, because the moderated indirect effects of velocity on utility (H2c) and on SCB (H2d) via expectancy-SOP depend on these results, these hypotheses were also not supported. Nonetheless, there were significant indirect effects of the velocity manipulation on utility via expectancy-SOP ($IE_{Slow} = .027$, 95% CI [.007, .056]; $IE_{Fast} = -.021$, 95% CI [-.047, -.003]), as well as significant serial indirect effects of velocity on SCBs via expectancy-SOP and utility ($IE_{Slow} = .017$, 95% CI [.004, .038]; $IE_{Fast} = -.013$, 95% CI [-.032, -.002]). In sum, we found support for the pathway via expectancy-SOP linking velocity and utility, yet this pathway was not moderated by expectancy-SCB.

Hypothesis 3. Relative to average velocity, slow velocity resulted in increased frustration ($\gamma = .23$, $SE = .05$, $p < .001$). However, fast velocity was not related to frustration ($\gamma = -.06$, $SE = .05$, $p = .174$). Altogether, these results suggest that slower-than-average velocity—but not faster-than-average velocity—influenced participants' frustration during goal pursuit. Thus, these results provide partial support for H3a.

Next, H3b hypothesized that frustration would be positively related to utility, and that this relationship would be moderated by expectancy-SCB. Specifically, we predicted that the positive relationship between frustration and utility would be stronger when expectancy-SCB is high as opposed to low. This interaction was significant ($\gamma = .09$, $SE = .05$, $p = .048$, $\Delta R^2 = .01$). In line with H3b, the relationship between frustration and utility was stronger when expectancy-SCB was high ($\gamma = .28$, $SE = .06$, $p < .001$) as opposed to low ($\gamma = .12$, $SE = .06$, $p = .044$). This interaction is plotted in Figure 4.

We tested H3c and H3d using the estimates obtained from these simple slopes analyses. These indirect effects are presented in Table 3. Consistent with H3c, the positive indirect effect of *slow velocity* on utility via frustration was larger when expectancy-SCB was high, relative to when expectancy-SCB was low (difference = .034, 95% CI [-.004, .082]). However, the 95% confidence interval of the difference between these two indirect effects included zero. Nonetheless, the magnitudes of these indirect effects depends on the level of moderator variable at which the indirect effects are tested. In this case, we tested these indirect effects at values of expectancy-SCB corresponding to +/-1 SD. However, +/-1 SD is an arbitrary value and was chosen by convention. To this end, we tested the difference between these indirect effects at different levels of expectancy-SCB. The difference in indirect effects becomes significant at values of expectancy-SCB +/- 1.25 SD (difference = .043, 95% CI [.001, .099]).[4] Taken together with the significant interaction between frustration and expectancy-SOP on utility, these results indicate that the indirect effect of velocity on utility was indeed dependent on the level of expectancy-SCB. Therefore, these results support H3c.

Next, the positive serial indirect effect of *slow velocity* on SCB via frustration and utility was significant when expectancy-SCB was high, as well as when expectancy-SCB was low (see Table 3). As with H3c, the 95% confidence interval of the difference between these serial indirect effects included zero (difference = .022, 95% CI [-.002, .056]). Yet, this difference was significant at values of expectancy-SCB +/- 1.25 SD (difference = .028, 95% CI [.001, .068]). Thus, H3d was supported.

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[4] Given that expectancy-SCB was scaled from 0 (0% chance of success) to 10 (100% chance of success), and the within-person standard deviation of expectancy-SCB was .83, +/-1 SD corresponds to +/-8.3%. Likewise, +/-1.25 SD corresponds to +/-10.4%. Therefore, the difference between these values corresponded to a +/-2.1% difference in perceived chances of success.

Finally, because the fast velocity dummy variable was not significantly related to frustration, the indirect effects involving fast velocity were also non-significant. Therefore, H3c and H3d were only partially supported. Specifically, experiencing slower-than-average velocity had indirect effects on utility and SCBs via frustration, but only to the degree that SCBs were seen as viable means of goal pursuit (i.e., when expectancy-SCB was high). However, experiencing faster-than-average velocity had no significant influence on this process.

Discussion

The results of Study 1 support our overall proposition that velocity can lead to SCBs via both a strategic pathway (i.e., expectancy-SOP) and an emotional pathway (i.e., frustration). However, results regarding the moderating effects of expectancy-SCB were mixed; whereas expectancy-SCB moderated the relationship between frustration and utility as expected, the predicted expectancy-SOP $\times$ expectancy-SCB interaction was non-significant. Instead, expectancy-SOP was negatively related to utility *regardless* of the level of expectancy-SCB. An implication of these results is that participants may have perceived SCB to be useful *even* when expectancy-SCB were not perceived as particularly viable means of reaching the goal. However, this pattern of results may have been driven by the incentive structure used in Study 1.

Specifically, an anonymous reviewer noted that participants may have perceived the monetary penalties associated with the use of SCBs to be low, relative to the penalties associated with working too slowly. That is, whereas taking a shortcut during the current study *may* have led to a $0.10 penalty, working too slowly *was certain* to lead to a financial penalty. Indeed, missing the deadline by just five seconds resulted in a $0.10 loss (i.e., $0.02 per sec x 5 sec). Thus, participants may have reasoned that the possibility of incurring a $0.10 loss for taking a shortcut was preferable to the guaranteed loss associated with working too slowly. Thus, the

design of Study 1 may have provided participants with a strong incentive to eschew standard

procedures in favor of shortcuts, regardless of the perceived effectiveness of SCBs.

Yet, this incentive structure may not necessarily reflect the incentives present in a typical

workplace setting. For example, in many cases the consequences of engaging in SCBs may

include poor-quality work and being reprimanded by a supervisor. Although these consequences

are not necessarily catastrophic, they are nonetheless likely to be perceived as stronger

disincentives of engaging in SCBs than the $0.10 penalty used in Study 1. We address this

limitation in Study 2 by conducting a daily diary study in which we asked full-time employees to

report on their own use of SCBs at work. Doing so allows us to determine whether the processes

observed in Study 1 generalize to more natural work settings.

Similarly, an anonymous reviewer highlighted that the utility items used in Study 1 made

no reference to the potential negative outcomes occurring as a result of SCBs. Instead, the utility

items used in Study 1 emphasized the potential positive outcomes associated with SCBs (e.g.,

"paying off"), and thus, may have provided incomplete coverage of participants' utility

perceptions. We address this limitation in Study 2 by using a measure of utility that explicitly

considers both the positive and negative potential outcomes associated with SCBs.

Finally, in Study 1 we manipulated velocity relative to a *normative* referent. Normative

velocity feedback has successfully been used in past research to alter velocity perceptions

(Chang et al., 2010, Huang & Zhang, 2011), and participants' responses to the manipulation

check questions suggest that the manipulation functioned as intended in the current research.

Nonetheless, it is possible that some participants' individual velocity referents may not have

matched this manipulation. That is, some participants may have been satisfied with slow

velocity, meaning "average" velocity is above their referent. Likewise, others may have only

been satisfied with fast velocity, meaning "average" velocity was below referent. To this end, in

Study 2 we directly measured velocity relative to an internal personal referent. Additionally, we

included items referencing several sources of internal referents (e.g., desired velocity, expected

velocity) in order to ensure adequate coverage of the velocity construct.

Study 2

Method

Study 2 was reviewed and approved by the University of Waterloo's Office of Research

Ethics (ORE Approval #42453: "Day-to-day experiences at work").

Participants and Procedure

Screening for Eligibility. Participants were recruited from Amazon's Mechanical Turk

(MTurk). We began by administering a one-time questionnaire to 1,000 potential participants to

determine eligibility for the study. Specifically, potential participants were told that in order to

participate in the current research they were first required to complete a brief survey to determine

their eligibility. The eligibility survey was administered on a Friday, and the focal study was

conducted over the following work week (Monday through Friday). All individuals who

completed the eligibility questionnaire were paid $1.00, regardless of their responses.

In an effort to ensure high quality responding, the advertisement for this research was

only visible to Mturk workers with at least a 95% approval rating and who had completed at least

50 Mturk assignments in the past. Furthermore, the study was only visible to Mturk workers

residing within the United States. In particular, only U.S. Mturk workers residing in either the

Eastern or Central time zones could view the advertisement. We restricted access to the study

based on time zone because during the focal study participants were required to respond to

morning and afternoon surveys, meaning it was important that all participants were reporting on

approximately the same portion of their workday. Finally, the study was not visible to Mturk workers who had participated in another SCB study that we had previously conducted.

Before accessing the eligibility questionnaire, individuals reported their age, whether or not they were employed (not including Mturk), and the number of hours worked per week (also not including Mturk). Individuals who were not at least 18 years old and did not work at least 30 hours per week were informed that they were ineligible to participate. We also included two additional items designed to screen out non-human respondents (i.e., "bots"). Individuals who passed all screening items were given access to the eligibility questionnaire.

The primary purpose of the eligibility questionnaire was to determine whether or not the potential participant would be working when the daily diary data would be collected. To this end, individuals were asked to indicate the specific days that they anticipated working, as well as their anticipated work schedule for the upcoming work week. To be eligible for the focal study individuals needed to indicate that they intended to work primarily during standard business hours (i.e., approximately 9:00 AM - 5:00 PM) every day of the upcoming work week (i.e., Monday – Friday). This questionnaire also contained several demographic questions, including race, gender, primary language spoken, industry, income, and education. Finally, we also included a three-item measure of work autonomy (Hackman & Oldham, 1980) for exploratory purposes; this variable is not considered further.[5]

As noted above, 1,000 individuals completed the eligibility questionnaire. Upon completing the questionnaire, individuals who were not eligible for the focal study ($N = 399$)

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[5] Because data were collected during the Covid-19 pandemic (November 2020), we also included several questions regarding the impact of the pandemic on the individual's work situation. Specifically, individuals were asked if they were considered an "essential worker," if their work hours had changed as a result of the pandemic, and if their work setting (i.e., inside vs. outside the home) had changed as a result of the pandemic. Responses to these questions had no influence on the results, and thus, are not considered further.

were thanked and debriefed. Conversely, individuals who were eligible for the focal study (*N* =

601) were provided with detailed information about the study and were invited to participate. In

particular, these individuals were told that they would receive two brief surveys each day over

the following work week (Monday through Friday). Of the 601 potential participants, 489

indicated that they were interested in participating in the focal study. Of these individuals, only

those who completed both the midday and the evening surveys on at least three days were

included in our analyses (*N* = 395). The final sample was 54.4% male, 81.5 % Caucasian, had a

mean age of 39.2 (*SD* = 10.2) years, and worked 41.9 hours per week (*SD* = 5.6) on average.

Participants worked in various sectors, including professional, scientific, or technical services

(15.0%), educational services (11.1%), finance or insurance (10.0%), information technology

(8.8%), and healthcare or social assistance (8.4%).

Focal Study. Participants completed two brief surveys per day over five consecutive

workdays. During each workday, participants received an email invitation at 11:00 am (Eastern

Standard Time) to complete the *midday* survey. This survey contained measures of velocity,

expectancy (both SOP and SCB), frustration, and perceived utility of SCBs. The questions

referenced participants' experience at work up until that point in the day. Participants were then

contacted again at 5:00 pm to complete the *evening* survey. This survey contained a measure of

the amount of SCBs in which participants had engaged during the previous three hours at work

(i.e., since the midday survey). Both the midday and evening surveys were open for three hours,

thereby allowing participants adequate time to respond while also isolating responses to a

specific portion of the day.

Participants were paid $0.25 for each survey they completed, meaning they could earn up

to $2.50 ($0.25 per survey x 5 midday surveys + $0.25 per survey x 5 evening surveys).

Furthermore, we also provided bonus payments to incentivize completing as many surveys as possible. That is, participants received a daily bonus of $1.00 for each day in which they completed both the midday and the evening surveys. Therefore, participants would earn an additional $5.00 by completing both daily surveys. Also, participants who completed all 10 daily surveys received an additional $2.50. Thus, participants could earn up to $10.00 in total ($2.50 base pay + $5.00 daily bonus + $2.50 full-completion bonus). Recall that only days on which participants responded to both the midday and evening surveys are included in our analyses. On average, participants provided responses on 4.8 days ($SD = .50$) out of a possible maximum of five. Our final data set contained 1614 observations nested within 395 individuals.

Measures

Velocity. We measured velocity using a three-item scale designed for this study. The items were written to measure perceived velocity relative to an internal referent. In particular, although the velocity literature is clear that individuals regulate velocity against internal standards, there is far less clarity regarding the source (or sources) of velocity referents. Thus, we wrote items to capture three potential sources of velocity referents: the velocity that is *minimally acceptable* (e.g., to reach a goal), the velocity that is *expected* (e.g., based on previous experience), and the velocity that is *desired*. Participants were asked to think about the progress they had made towards their work goals up until the current point in the day. The three items were: "Today, compared to the rate of progress that I would have considered *acceptable*, my actual rate of progress has been…," "Today, compared to the rate at which I *expected* to make progress towards my goals, my actual rate of progress has been…," and "Today, compared to the rate at which I *wanted* to make progress towards my goals, my actual rate of progress has

been…" Participants responded on a scale from 1 (slower) to 5 (faster). The average Cronbach's

alpha reliability across all five days was .88.

Expectancy-SOP. We measured expectancy-SOP using Sanchez et al.'s (2000) three-

item scale, which we adapted for the current study[6]. Sample items include "If I follow standard

procedures at work today I will accomplish my work tasks by the end of the day," and "If I

follow standard procedures at work today I will get all my work done by the end of the day."

Participants responded on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). The

average Cronbach's alpha across all five days was .95.

Expectancy-SCB. We also used Sanchez et al.'s (2000) three-item scale to measure

expectancy-SCB. For example: "If I take shortcuts at work today I will accomplish my work

tasks by the end of the day," Participants responded on a 5-point scale (1 = *strongly disagree*, 5 =

strongly agree). The average Cronbach's alpha across all five days was .97.

Frustration. We measured frustration using the same three-item scale from Peters et al.

(1980) that was used in Study 1. The items were slightly adapted to fit the current study.

Example items include "Today, trying to get my job done has been a very frustrating

experience," and "Today, I am experiencing a great deal of frustration on my job." Participants

responded on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). The average

Cronbach's alpha across all five days was .93.

Utility. We measured utility using four items developed for this study. In particular, we

developed items to capture perceptions of both positive *and* negative outcomes associated with

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[6] Participants were shown the following instructions before responding to the expectancy-SOP and expectancy-SCB items: "Often, there are multiple ways to complete the same work task. For example, you might follow standard procedures. That is, you may complete the task by following the specific steps and procedures that are formally mandated by your employer. In other words, you may complete the task "by the book." However, you might also take shortcuts. That is, you may skip some of the steps and procedures formally mandated by your employer to save time and complete the task more rapidly. In other words, you may complete the task by "cutting corners" on the job. Please rate the following statements regarding these two ways of completing your work tasks."

SCBs. The items were "Taking shortcuts will be useful for keeping up the pace of work," "It will be beneficial to take shortcuts when working on my tasks," "Taking shortcuts will do more harm than good," (reverse-coded) and "It will be a bad idea to take shortcuts when working on my tasks" (reverse-coded). Participants responded on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). The average Cronbach's alpha across all five days was .90.

SCB. We measured SCBs using Jonason and O'Connor's (2017) eight-item scale, which we adapted for this study. Participants responded to the items with regards to their behaviors during the last 3 hours of their workday. Sample items included "I cut corners at work," and "I took shortcuts at work to get ahead." Participants responded on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). The average Cronbach's alpha across all five days was .92.

Analysis Plan

As in Study 1, we tested our hypotheses using MSEM. Specifically, we specified a model in which (1) expectancy-SOP and frustration were both regressed on velocity, (2) utility was regressed on expectancy-SOP, frustration, expectancy-SCB, the expectancy-SOP × expectancy-SCB interaction, and the frustration × expectancy-SCB interaction, and (3) SCB was regressed on utility (see Figure 1). We also specified the same covariances among variables as in the model tested in Study 1. Specifically, (1) the proposed mediators were allowed to covary, (2) expectancy-SOP and expectancy-SCB were allowed to covary, (3) both interaction terms were allowed to covary with their constituents, and (4) both interaction terms were allowed to covary with each other. As in Study 1, significant interactions were probed using simple slopes analyses (Cohen et al., 2003), and indirect effects were tested using Monte Carlo simulations (Bauer et al., 2006; Preacher & Selig, 2012) with 10,000 replications.

Furthermore, as was done in Study 1, in Study 2 we modeled relationships among observed variables, rather than latent variables. Because we hypothesized interactions, a latent variable approach would require us to model interactions among latent variables. Yet, conventional model fit indices cannot be computed when testing models that include interactions among latent variables (Maslowsky et al., 2015; Sardeshmukh & Vandenberg, 2017). Thus, we opted to model relationships among observed (rather than latent) variables when testing the proposed model. Nonetheless, although conventional fit statistics are not available, it is still possible to evaluate the path coefficients in models containing interactions among latent variables. Importantly, this approach does not change the interpretation of any hypothesis test in the current research. These results are presented in the supplemental materials.

Results

Descriptive Statistics

Means, standard deviations, intercorrelations, internal consistency reliabilities, and ICC(1) for Study 2 are shown in Table 4.

Measurement Invariance

We used confirmatory factor analyses to test the measurement invariance of the scales used in Study 2. Doing so is important to ensure that participants interpreted the measures in a consistent manner across measurement periods (Vandenberg & Lance, 2000). First, we tested for *configural invariance* by specifying our measurement model (Model 1): that is, the velocity, expectancy-SOP, frustration, expectancy-SCB, utility, and SCB items were set to load onto their respective factors across all five measurement points. Like items were allowed to correlate across time, latent factors were allowed to covary, and latent factor means were set to zero. All other parameters (factor loadings, item intercepts, and residual variances) were freely estimated.

Model 1 fit the data well ($\chi^2 = 4010.38$, df = 1185, CFI = .928, RMSEA = .086, SRMR = .045), thus providing evidence for configural invariance.

Next, we tested *metric invariance* by specifying the same factor model, but with like factor loadings constrained to be equal across time (Model 2). We compared the change in fit from Model 1 to Model 2. Change in comparative fit index (ΔCFI) was used to compare models; models with ΔCFI equal or less than .002 were considered invariant (Meade et al., 2008). We used ΔCFI rather than the $\Delta\chi^2$ because the ΔCFI test has greater power and lower Type I error rates. Model 2 provided good fit to the data ($\chi^2 = 4076.16$, df = 1257, CFI = .929, RMSEA = .083, SRMR = .048), and fit was not significantly different from Model 1 (ΔCFI < .001) despite the increased restrictions. These results provide support for metric invariance.

We also tested several more stringent models of measurement invariance, none of which resulted in a significant decrement in model fit. These tests are presented in the supplemental materials. In total, the measurement invariance tests provide strong support for our measurement model. Specifically, these results indicate that our measures capture distinct constructs, and that these measures were perceived consistently by participants over the course of the study.

Hypothesis Tests

Results of all hypothesis tests are summarized in Table 5. The proposed model provided acceptable fit to the data based on conventional criteria ($\chi^2 = 235.88$, df = 13, CFI = .934, RMSEA = .103, SRMR = .079).

Hypothesis 1. Utility was positively related to SCBs ($\gamma = .39$, *SE* = .03, *p* < .001), meaning H1 was supported.

Hypothesis 2. Velocity was positively related to expectancy-SOP ($\gamma = .45$, *SE* = .02, *p* < .001), supporting H2a. Furthermore, expectancy-SOP was negatively related to utility ($\gamma =$

-.25, $SE = .02$, $p < .001$), and this effect was qualified by a significant expectancy-SOP ×

expectancy-SCB interaction ($\gamma = .06$, $SE = .03$, $p = .049$; see Figure 5). However, this interaction

term accounted for a very small proportion of unique variance beyond the main effects (ΔR^2

$= .001$). Furthermore, contrary to H2b, the relationship between expectancy-SOP and utility was

weaker when expectancy-SCB was high ($\gamma = -.22$, $SE = .03$, $p < .001$) as opposed to low ($\gamma =$

$-.29$, $SE = .03$, $p < .001$). Therefore, H2b was not supported. As a result, H2c and H2d were also

not supported.

For the sake of completeness, we calculated the overall indirect effects of velocity on

utility and SCB via expectancy-SOP.[7] This is the same approach as was used in Study 1.

Specifically, there was a significant negative indirect effect of velocity on utility via expectancy-

SOP (IE = -.112, 95% CI [-.135, -.091]), as well as a significant negative *serial* indirect effect of

velocity on SCB via expectancy-SOP and utility (IE = -.044, 95% CI [-.054, -.034]). In sum, the

results suggest that when participants perceived slower-than-referent velocity, they felt less

confident with regards to meeting their work goals, perceived more utility in SCB, and engaged

in more SCBs. Yet, expectancy-SCB did not strengthen these effects.

Hypothesis 3. In support of H3a, velocity was negatively related to frustration ($\gamma = -.59$,

$SE = .02$, $p < .001$). Also, there was a significant frustration × expectancy-SCB interaction on

utility ($\gamma = .10$, $SE = .02$, $p < .001$, $\Delta R^2 = .01$; see Figure 6). The positive relationship between

frustration and utility was stronger when expectancy-SCB was high ($\gamma = .22$, $SE = .02$, $p < .001$),

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[7] Given the significant expectancy-SOP × expectancy-SCB interaction on utility, we also conducted these analyses separately across low and high levels of expectancy-SCB. These results are summarized in detail in the SOM. Notably, the indirect effect of velocity on utility did not differ across levels of expectancy-SCB (difference = .032, 95% C.I. [-.004, .068]), nor did the serial indirect effect of velocity on SCBs (difference = .012, 95% C.I. [-.002, .027]).

relative to when expectancy-SCB was low ($\gamma = .09$, *SE* = .02, $p < .001$). Thus, H3b was

supported.

Next, as shown in Table 6, there was a negative indirect effect of velocity on utility via

frustration, and this effect was stronger when expectancy-SCB was high, relative to when

expectancy-SCB was low (difference = -.074, 95% CI [-.113, -.036]). Thus, H3c was supported.

Likewise, H3d was also supported. Specifically, the negative *serial* indirect effect of velocity on

SCB via frustration and utility was stronger when expectancy-SCB was high, relative to when

expectancy-SCB was low (difference = -.029, 95% CI [-.045, -.014]). In sum, these results

suggest that when participants experienced slower-than-referent velocity, they felt increased

frustration, perceived increased utility in SCBs, and engaged in more SCBs. This was especially

likely to occur when SCBs were perceived to be highly viable means of meeting work goals.

Discussion

Study 2 replicated key findings from Study 1 using a daily diary design. Specifically, as

in Study 1, velocity influenced utility perceptions via both strategic (i.e., expectancy-SOP) and

emotional (i.e., frustration) pathways, and utility was related to SCBs in turn. Study 2 also

addresses some of Study 1's limitations by including a velocity measure in which participants

rated their rate of progress relative to a personal referent, as well as a utility measure that

referenced both the positive and negative outcomes associated to SCBs. As a whole, Study 2

shows that the results observed in Study 1 are not limited to the specific laboratory context, but

rather, that these effects generalize to employees across a variety of different jobs.

However, as in Study 1, our predictions regarding expectancy-SOP were not fully

supported. Although expectancy-SOP was negatively related to utility as anticipated, the

expectancy-SOP $\times$ expectancy-SCB interaction was not consistent with our predictions.

Specifically, the effects of expectancy-SOP on utility were *weaker* (rather than stronger) when expectancy-SCB was high, compared to when expectancy-SCB was low. Therefore, contrary to our hypothesis, in both Studies 1 and 2 expectancy-SCB did not *strengthen* the effects of velocity on utility and SCBs via expectancy-SOP. We return to this issue in the General Discussion.

General Discussion

SCBs allow employees to complete work tasks more rapidly than standard procedures, but can also lead to undesirable outcomes, which range from the spread of foodborne illnesses (Green et al., 2007) to large-scale disasters such as the explosion of the Deepwater Horizon oil platform (Reader & O'Connor, 2014). Despite the significant workplace implications of SCBs, little research has investigated the reasons individuals take shortcuts. Drawing on theories of self-regulation (e.g., Carver & Scheier, 1998), we proposed and found across two studies that individuals engage in SCBs to regulate velocity. Furthermore, we found evidence to suggest that the experience of slow velocity leads to SCBs via both expectancy-SOP and frustration. Together these studies indicate that SCBs are driven by cognitive *and* emotional reactions to velocity.

Theoretical Implications and Directions for Future Research

Self-Regulatory Underpinnings of SCBs

Whereas previous research has identified individual differences linked to SCBs (Jonason & O'Connor, 2017; Yan et al., 2021), as well as situational antecedents of SCBs (Dai et al., 2015; Halbesleben, 2010), few studies have examined the self-regulatory underpinnings of SCBs. As an exception, Beck, Scholer, and Schmidt (2017) demonstrated that individuals engage in SCBs to manage large workloads within stringent deadlines. We expanded on these findings by providing direct evidence that SCBs are driven by the need to increase velocity. As such, our findings corroborate arguments made within the broader self-regulation literature; beyond simply

progressing towards their goals, individuals seek to maintain satisfactory rates of goal progress (Carver & Scheier, 1990, 1998). Yet, theory and research within the velocity literature have paid little attention to the specific behaviors a person may engage in response to slower-than-referent velocity. We addressed this gap by identifying the use of SCBs as one such behavior.

Speed-accuracy Trade-offs

The use of SCBs to regulate velocity can be considered a trade-off between speed and accuracy; SCBs increase the rate at which work can be performed, but may also lead to lower quality work and an increased risk of accidents. Although speed-accuracy trade-offs have been considered within previous research (Audia et al., 1996; Gilliland & Landis, 1992; Locke et al., 1994), this work has not been integrated with the velocity literature. However, speed-accuracy trade-offs inherently result from individuals' efforts to regulate their rate of progress, meaning velocity research likely provides important insights into speed-accuracy trade-offs. For instance, whereas previous research has shown that speed-accuracy trade-offs are often driven by strategic decision-making processes (Förster et al., 2003), we demonstrate that strategic considerations cannot fully account for these trade-offs. Instead, speed-accuracy trade-offs appear to be at least partially driven by individuals' emotional reactions to slow progress. Thus, further integration of these literatures is likely warranted. Incorporating the emotional processes involved in individuals' efforts to regulate velocity may lead to a more thorough understanding of speed-accuracy trade-offs.

Incorporating Additional Determinants of Utility

In this manuscript we considered expectancy and frustration as two determinants of the utility of engaging in SCBs. We argued that these variables served as indicators of the degree to which standard work procedures are sufficient for completing the task at hand. Said differently,

expectancy-SOP and frustration could be construed as cognitive and emotional signals of the *likelihood* that a goal can be accomplished within the deadline. Yet, the perceived *value* of the goal being pursued is also likely to be an important determinant of utility (e.g., Steel & König, 2006; Tversky & Kahneman, 1992; Vancouver et al., 2010). That is, individuals may be more likely to "do whatever it takes," such as engaging in SCBs, when a highly valued outcome is on the line. Beyond value, there may be additional determinants of utility that warrant attention. For instance, Steel and König argued that utility is higher for actions that yield immediate rewards, relative to actions for which outcomes are delayed. With regard to SCBs, the benefits may be realized almost immediately. For example, skipping proper handwashing procedures may allow a restaurant employee to serve customers more rapidly. Yet, the downsides associated with SCBs may not occur until later in the future (e.g., when a customer becomes ill). Furthermore, future studies may benefit from investigating the role of individual differences (e.g., impulsiveness) that may accentuate or weaken this discounting effect (Steel, 2007).

Expectancy-SCB Did Not Strengthen the Relationship between Expectancy-SOP and Utility

Although we hypothesized that expectancy-SCB would strengthen the negative relationship between expectancy-SOP and the perceived utility of engaging in SCBs, this was not the case in either Study 1 or Study 2. Although we did observe a significant interaction between expectancy-SOP and expectancy-SCB on utility in Study 2, the form of this interaction was opposite of our hypothesis. That is, the relationship between expectancy-SOP and utility was *weaker* when expectancy-SCB was high, relative to when expectancy-SCB was low. However, we urge caution before interpreting this interaction. For one, as noted above, the interaction effect was quite small ($\Delta R^2 = .001$), and the negative simple slopes of expectancy-SOP on utility were similar (and statistically significant) across levels of expectancy-SCB. Furthermore, we

have no theoretical reason for this pattern (indeed, we hypothesized the opposite), and this interaction was not observed in Study 1. Therefore, we believe this significant interaction term is most likely a Type 1 error, and instead focus our interpretation on the negative main effect of expectancy-SOP on utility.

Because SCBs can cause negative outcomes, we reasoned that if the goal was unlikely to be met on time even if SCBs were used, then individuals would not perceive much utility in these behaviors, regardless of whether or not standard procedures were sufficient for completing the goal on time. However, in retrospect we realize that there may be reasons that SCBs hold high utility, even if expectancy-SCB is relatively low. In particular, when faced with the prospect of not meeting the deadline (i.e., low expectancy-SOP), SCBs may be seen as a "last ditch effort." When the standard procedures are perceived to lead to almost certain failure, SCBs may be perceived to be "worth a shot" regardless of their expected level of effectiveness. Indeed, previous research indicates that individuals become more tolerant of risks at times when facing losses and when they believe they have few alternatives (Scholer et al., 2010).

Of course, this explanation for our results implies that participants in our studies were not highly sensitive to the potential negative consequences of SCBs. This assumption may be reasonable for Study 1; as noted above the financial penalties associated with SCBs were relatively mild. However, in Study 2 participants reported on their actual workplace behavior, meaning SCBs had the potential to be associated with serious outcomes. Nonetheless, most participants in Study 2 worked in the knowledge and service sectors. In most cases, these individuals were probably not engaged in SCBs with the potential to threaten life and limb. Thus, future research in which the (negative) valence associated with SCBs is varied may be warranted. We argue that the expectancy-SOP $\times$ expectancy-SCB interaction on utility is more

likely to emerge when the SCBs in question can cause severe outcomes like accidents and injuries. Likewise, we anticipate the pattern of results observed in the current study when SCBs are associated with less severe outcomes (e.g., lower quality work).

Finally, it is unclear why the expectancy-SOP $\times$ expectancy-SCB interaction on utility did not match our hypotheses, yet the frustration $\times$ expectancy-SCB interaction was in line with our hypotheses and highly consistent across both studies. That is, we argued that both expectancy-SOP and frustration served as signals that the standard work procedures were not satisfactory and that an alternative approach to goal pursuit was needed. We believe the difference in the pattern of results across these variables may be due to the precision of that signal. In particular, expectancy perceptions are relatively precise and can be verbalized. Thus, low expectancy-SOP reflects a clear belief that standard procedures are insufficient. Yet emotions like frustration are less precise and their specific magnitude is relatively hazy (Carver & Scheier, 1998). As a result, the effect of frustration on the perceived utility of SCBs may be more likely to be tempered by low expectancy-SCB, relative to the effect of expectancy-SOP. In other words, individuals may be more willing to act on a clear signal that standard procedures are no longer sufficient, whereas "fuzzier" signals may be more affected by additional information (i.e., expectancy-SCB). Of course, this post hoc explanation requires confirmation via additional empirical research.

Practical Implications

This research indicates that workplace SCBs may be curbed by addressing individuals' *experience* of slow velocity. One way this might be done is to implement changes that allow employees to work more rapidly, such as removing bureaucratic red tape and upgrading outdated equipment and software. Yet, we acknowledge that in many cases it may not be feasible to

increase employees' *actual* rate of progress. Instead, organizations might seek to alter how employees *interpret* their velocity. For instance, new employees may experience slow progress while learning new work tasks and feel frustrated as a result. Although it may not be possible to simply increase these employees' actual rate of progress, organizations may instead be able to alleviate frustration by communicating that slower progress is expected during the learning process. By tempering unrealistic velocity expectations, it may be possible for employees to remain satisfied with their rate of progress, and thus resist the temptation to take shortcuts.

Additionally, some workplace practices may inadvertently lead employees to form unrealistic expectations regarding the rate at which work can be completed. For instance, when employees receive training on standard work procedures, the training may occur under ideal conditions (e.g., restaurant hygiene training might occur during downtime). On the one hand, training under ideal conditions allows employees to dedicate attention to learning, as opposed to other job demands (e.g., dealing with customers). However, this approach may also result in trainees forming unrealistic velocity referents that are unlikely to be attained under typical work conditions. As a result, trainees may experience slow velocity, and in turn, feel compelled to take shortcuts. Thus, it is important to consider how employees form expectations regarding velocity, as well as how organizational practices may contribute to unrealistic expectations.

Strengths and Limitations

A key strength of this research is the use of different methodologies to test our hypotheses. Specifically, we conducted an experiment in Study 1 and collected daily diary data in Study 2. Importantly, the limitations of each individual study are offset by the strengths of the other. For instance, as noted previously, a limitation of Study 1 was that its incentive structure may have provided participants with a disproportionate incentive to use SCBs, which may raise

questions as to whether the results observed would generalize in more typical work settings. We

addressed this limitation in Study 2 by collecting daily diary data in which employees reported

on their velocity and SCBs. Nonetheless, the use of self-report measures is a limitation of Study

2, as employees may not necessarily be honest or accurate when reporting on their own use of

SCBs. Moreover, daily diary studies do not allow for strong causal inferences. Fortunately, the

design of Study 1 addresses those concerns, as in we manipulated velocity and directly observed

SCBs. In sum, the fact that we obtained nearly identical findings across two studies using very

different methodologies speaks to the robustness of these results.

Conclusion

Shortcuts offer increased speed and efficiency relative to standard procedures, but can

also lead to undesirable outcomes for employees, organizations, and the broader public. In spite

of these outcomes, few studies have thoroughly investigated the reasons individuals take

shortcuts at work. Across two studies, we found that individuals take shortcuts to increase

velocity, and further, that the decision to engage in SCBs is driven by two separate and

independent pathways. On the one hand, we found that individuals may take shortcuts based on a

relatively strategic consideration of their likelihood of goal success. On the other hand, we also

found evidence to suggest that individuals also take shortcuts to alleviate feelings of frustration.

Altogether, the current studies demonstrate that the decision to engage in SCBs is determined by

both strategic and emotionally-laden processes. Accordingly, we encourage researchers and

practitioners to consider both types of mechanisms in efforts to understand and prevent SCBs.

References

Audia, G., Kristof-Brown, A., Brown, K. G., & Locke, E. A. (1996). Relationship of goals and microlevel work processes to performance on a multipath manual task. *Journal of Applied Psychology*, *81*, 483-497. https://doi.org/10.1037/0021-9010.81.5.483

Audirac, I. (2008). Sharing fast-speed and slow-speed roads with bicyclists and pedestrians: A source of female and male driver frustration? *Transportation Research Record*, *2067*, 65-74. https://doi.org/10.3141/2F2067-08

Ballard, T., Vancouver, J. B., & Neal, A. (2018). On the pursuit of multiple goals with different deadlines. *Journal of Applied Psychology*, *103*, 1242-1264. https://doi.org/10.1037/apl0000304

Bauer, D. J., Preacher, K. J., & Gil, K. M. (2006). Conceptualizing and testing random indirect effects and moderated mediation in multilevel models: new procedures and recommendations. *Psychological methods*, *11*, 142-163. https://psycnet.apa.org/doi/10.1037/1082-989X.11.2.142

Beck, J. W., Scholer, A. A., & Hughes, J. (2017). Divergent effects of distance versus velocity disturbances on emotional experiences during goal pursuit. *Journal of Applied Psychology*, *102*, 1109-1123. http://dx.doi.org/10.1037/apl0000210

Beck, J. W., Scholer, A. A., & Schmidt, A. M. (2017). Workload, risks, and goal framing as antecedents of shortcut behaviors. *Journal of Business and Psychology, 32,* 421-440. https://doi.org/10.1007/s10869-016-9450-0

Berkowitz, L. (1989). Frustration-aggression hypothesis: Examination and reformulation. *Psychological Bulletin, 106*, 59-73. https://doi.org/10.1037/0033-2909.106.1.59

Berkowitz, L., & Harmon-Jones, E. (2004). Toward an understanding of the determinants of

anger. *Emotion, 2,* 107-130. https://doi.org/10.1037/1528-3542.4.2.107

Campbell, J. P., & Wiernik, B. M. (2015). The modeling and assessment of work performance.

    Annual Review of Organizational Psychology and Organizational Behavior, *2*, 47-74.

    https://doi.org/10.1146/annurev-orgpsych-032414-111427

Carver, C. S., & Scheier, M. F. (1990). Origins and functions of positive and negative affect: A

    control-process view. *Psychological Review, 97*, 19-35. https://doi.org/10.1037/0033-

    295X.97.1.19

Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior*. New York:

    Cambridge University Press.

Chang, C.-H., Johnson, R. E., & Lord, R. G. (2010). Moving beyond discrepancies: The

    importance of velocity as a predictor of satisfaction and motivation. *Human Performance,*

    23, 58-80. http://dx.doi.org/10.1080/08959280903400226

Cialdini, R. B., Demaine, L. J., Sagarin, B. J., Barrett, D. W., Rhoads, K., & Winter, P. L.

    (2006). Managing social norms for persuasive impact. *Social Influence*, *1*, 3–15.

    https://doi.org/10.1080/15534510500181459

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation*

    analysis for the behavioral sciences (3rd ed.). Mahwah, NJ: Erlbaum.

Dai, H., Milkman, K. L., Hofmann, D. A., & Staats, B. R. (2015). The impact of time at work

    and time off from work on rule compliance: The case of hand hygiene in health care.

    Journal of Applied Psychology, 100, 846-862. https://doi.org/10.1037/a0038067

Elicker, J. D., Lord, R. G., Ash, S. R., Kohari, N. E., Hruska, B. J., McConnell, N. L., &

    Medvedeff, M. E. (2010). Velocity as a predictor of performance satisfaction, mental

focus, and goal revision. *Applied Psychology: An International Review*, *59*, 495-514. https://doi.org/10.1111/j.1464-0597.2009.00409.x

Folkman, S., & Lazarus, R. S. (1980). An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior*, *21*, 219-239. https://doi.org/10.2307/2136617

Förster, J., Higgins, E. T., & Bianco, A. T. (2003). Speed/accuracy decisions in task performance: Built-in trade-off or separate strategic concerns? *Organizational Behavior and Human Decision Processes, 90*, 148–164. http://dx.doi.org/10.1016/S0749-5978(02)00509-5

Fox, S., & Spector, P. E. (1999). A model of work frustration–aggression. *Journal of Organizational Behavior, 20*, 915-931. https://doi.org/10.1002/(SICI)1099-1379(199911)20:6%3C915::AID-JOB918%3E3.0.CO;2-6

Gilliland, S. W., & Landis, R. S. (1992). Quality and quantity goals in a complex decision task: Strategies and outcomes. *Journal of Applied Psychology*, *77*, 672-681. https://doi.org/10.1037/0021-9010.77.5.672

Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research*, *35*, 472–482. https://doi.org/10.1086/586910

Green, L. R., Radke, V., Mason, R., Bushnell, L., Reimann, D. W., Mack, J. C., Motsinger, M. D., Stigger, T., & Selman, C. A. (2007). Factors related to food worker hand hygiene practices. *Journal of Food Protection*, *70*, 661–666. https://doi.org/10.4315/0362-028X-70.3.661

Hackman, J. R., & Oldham, G. R. (1980). *Work redesign*. Reading, MA: Addison Wesley.

Halbesleben, J. R. B. (2010). The role of exhaustion and workarounds in predicting occupational

     injuries: A cross-lagged panel study of health care professionals. *Journal of Occupational*

     Health Psychology, *15*, 1–15. https://doi.org/10.1037/a0017634

Hannah, D. R., & Robertson, K. (2015). Why and how do employees break and bend

     confidential information protection rules? *Journal of Management Studies, 52*, 381-413.

     https://10.1111/joms.12120

Hofmann, D. A., & Gavin, M. B. (1998). Centering decisions in hierarchical linear models:

     Implications for research in organizations. *Journal of Management, 24*, 623-641.

     https://doi.org/10.1177/2F014920639802400504

Huang, S.-C., & Zhang, Y. (2011). Motivational consequences of perceived velocity in consumer

     goal pursuit. *Journal of Marketing Research*, *48*, 1045-1056.

     https://doi.org/10.1509/jmr.10.0063

Johnson, R. E., Howe, M. & Chang, C.-H. (2013). The importance of velocity, or why speed

     may matter more than distance. *Organizational Psychology Review, 3*, 62-85.

     https://doi.org/10.1177/2041386612463836

Jonason, P. K., & O'Connor, P. J. (2017). Cutting corners at work: An individual differences

     perspective. *Personality and Individual Differences, 107*, 146–153.

     http://dx.doi.org/10.1016/j.paid.2016.11.045

Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford

     publications.

Kruglanski, A. W., Chernikova, M., Babush, M., Dugas, M., & Schumpe, B. M. (2015). The

     architecture of goal systems: Multifinality, equifinality, and counterfinality in means-end

relations. In *Advances in motivation science* (Vol. 2, pp. 69-98). Elsevier.

https://doi.org/10.1016/bs.adms.2015.04.001

Lawrence, J. W., Carver, C. S., & Scheier, M. F. (2002). Velocity toward goal attainment in

immediate experience as a determinant of affect. *Journal of Applied Social Psychology*,

32, 788–802. https://doi.org/10.1111/j.1559-1816.2002.tb00242.x

Locke, E. A., Smith, K. G., Erez, M., Chah, D. O., & Schaffer, A. (1994). The effects of intra-

individual goal conflict on performance. *Journal of management*, *20*, 67-91.

https://doi.org/10.1177/014920639402000104

Lord, R. G., Diefendorff, J. M., Schmidt, A. M., & Hall, R. J. (2010). Self-regulation at

work. *Annual Review of Psychology*, *61*, 543-568.

https://doi.org/10.1146/annurev.psych.093008.100314

MacKinnon, D. P., Fritz, M. S., Williams, J., & Lockwood, C. M. (2007). Distribution of the

product confidence limits for the indirect effect: Program PRODCLIN. *Behavior*

research methods, *39*, 384-389. https://doi.org/10.3758/BF03193007

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A

comparison of methods to test mediation and other intervening variable effects.

Psychological Methods, 7, 83-104. http://dx.doi.org/10.1037/1082-989X.7.1.83

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect

effect: Distribution of the product and resampling methods. *Multivariate behavioral*

research, *39*, 99-128. https://doi.org/10.1207/s15327906mbr3901_4

Maslowsky, J., Jager, J., & Hemken, D. (2015). Estimating and interpreting latent variable

interactions: A tutorial for applying the latent moderated structural equations method.

International journal of behavioral development, *39*, 87-96.

https://doi.org/10.1177%2F0165025414552301

Meade, A. W., Johnson, E. C., & Braddy, P. W. (2008). Power and sensitivity of alternative fit indices in tests of measurement invariance. *Journal of applied psychology*, *93*, 568. https://doi.org/10.1037/0021-9010.93.3.568

Muthén, L. K., & Muthén, B. O. (2010). *Mplus user's guide* (6th ed.). Los Angeles, CA: Muthén & Muthén.

National Transportation Safety Board. (1997). Aircraft Accident Report: In-Flight Fire and Impact with Terrain, Valujet Airlines Flight 592. DC-9-32, N904VJ, Everglades, Near Miami, Florida.

Neal, A., Ballard, T., & Vancouver, J. B. (2017). Dynamic self-regulation and multiple-goal pursuit. *Annual Review of Organizational Psychology and Organizational Behavior*, *4*, 401-423. https://doi.org/10.1146/annurev-orgpsych-032516-113156

Parks, J. M., Ma, L., & Gallagher, D. G. (2010). Elasticity in the 'rules' of the game: Exploring organizational expedience. *Human Relations*, 63, 701-730. https://doi.org/10.1177/2F0018726709355331

Peters, L. H., O'Connor, E. J., & Rudolf, C. J. (1980). The behavioral and affective consequences of performance-relevant situational variables. *Organizational Behavior and Human Performance*, *25*, 79-96. https://doi.org/10.1016/0030-5073(80)90026-4

Phan, V., & Beck, J. W. (2020). The impact of goal progress velocity on affect while pursuing multiple sequential goals. *Motivation Science,* 6, 247-258. https://doi.org/10.1037/mot0000149

Preacher, K. J., & Selig, J. P. (2012). Advantages of Monte Carlo confidence intervals for

    indirect effects. *Communication Methods and Measures*, *6*, 77-98.

    https://doi.org/10.1080/19312458.2012.679848

Preacher, K. J., Zhang, Z., & Zyphur, M. J. (2016). Multilevel structural equation models for

    assessing moderation within and across levels of analysis. *Psychological methods*, *21*(2),

    189-205. https://doi.org/10.1037/a0020141

Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for

    assessing multilevel mediation. *Psychological methods*, *15*, 209-233.

    http://dx.doi.org/10.1037/met0000052

Reader, T. W., & O'Connor, P. (2014). The Deepwater Horizon explosion: non-technical skills,

    safety culture, and system complexity. *Journal of Risk Research, 17*, 405-424.

Richard, E. M., & Diefendorff, J. M. (2011). Self-regulation during a single performance

    episode: Mood-as-information in the absence of formal feedback. *Organizational*

    Behavior and Human Decision Processes, *115*, 99-110.

    https://doi.org/10.1080/13669877.2013.815652

Roseman, I. J., Wiest, C., & Swartz, T. S. (1994). Phenomenology, behaviors, and goals

    differentiate discrete emotions. *Journal of Personality and Social Psychology, 67*, 206-

    221. https://doi.org/10.1037/0022-3514.67.2.206

Sanchez, R. J., Truxillo, D. M., & Bauer, T. N. (2000). Development and examination of an

    expectancy-based measure of test-taking motivation. *Journal of Applied Psychology*, *85*,

    739-750. https://doi.org/10.1037/0021-9010.85.5.739

Sardeshmukh, S. R., & Vandenberg, R. J. (2017). Integrating moderation and mediation: A

    structural equation modeling approach. *Organizational Research Methods*, *20*, 721-745.

https://doi.org/10.1177/2F1094428115621609

Scholer, A. A., Zou, X., Fujita, K., Stroessner, S. J., & Higgins, E. T. (2010). When risk seeking becomes a motivational necessity. *Journal of Personality and Social Psychology*, *99*, 215–231. https://doi.org/10.1037/a0019715

Sekerka, L. E., & Zolin, R. (2007). Rule-bending: Can prudential judgment affect rule compliance and values in the workplace? *Public Integrity*, *9*, 225-243. http://doi.org/10.2753/PIN1099-9922090302

Simon, H. A. (1990). Invariants of human behavior. *Annual Review of Psychology*, *41*, 1-20.

Spector, P. E. (1978). Organizational frustration: A model and review of the literature. *Personnel Psychology*, *31*, 815-829. https://doi.org/10.1111/j.1744-6570.1978.tb02125.x

Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, *133*, 65-94. https://doi.org/10.1037/0033-2909.133.1.65

Steel, P., & König, C. J. (2006). Integrating theories of motivation. *Academy of Management Review*, *31*, 889-913. https://doi.org/10.2307/20159257

Sun, S., Vancouver, J. B., & Weinhardt, J. M. (2014). Goal choices and planning: Distinct expectancy and value effects in two goal processes. *Organizational Behavior and Human Decision Processes*, *125*, 220-233. https://doi.org/10.1016/j.obhdp.2014.09.002

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty, 5*, 297-323. https://doi.org/10.1007/BF00122574

Vance, A., Siponen, M., & Pahnila, S. (2012). Motivating IS security compliance: Insights from

    habit and protection motivation theory. *Information & Management*, *49*, 190-198.

    http://dx.doi.org/10.1016/j.im.2012.04.002

Vancouver, J. B., Weinhardt, J. M., & Schmidt, A. M. (2010). A formal, computational theory of

    multiple-goal pursuit: Integrating goal-choice and goal-striving processes. *Journal of*

    Applied Psychology, 95, 985-1008. https://doi.org/10.1037/a0020628

Vandenberg, R. J., & Lance, C. E. (2000). A Review and Synthesis of the Measurement

    Invariance Literature: Suggestions, Practices, and Recommendations for Organizational

    Research. *Organizational Research Methods*, *3*, 4–70.

    https://doi.org/10.1177/2F109442810031002

Van Eerde, W., & Thierry, H. (1996). Vroom's expectancy models and work related criteria: A

    meta-analysis. *Journal of Applied Psychology, 81*, 575–586.

    https://doi.org/10.1037/0021-9010.81.5.575

Wilt, J. A., Bleidorn, W., & Revelle, W. (2017). Velocity explains the links between personality

    states and affect. *Journal of Research in Personality*, 69, 86-95.

    https://doi.org/10.1016/j.jrp.2016.06.008

Yan, H., Hu, X., & Wu, C. H. (2021). When and why does proactive personality inhibit corner-

    cutting behaviors: A moderated mediation model of customer orientation and

    productivity climate. *Personality and Individual Differences*, *170*, 110443.

    https://doi.org/10.1016/j.paid.2020.110443

Table 1

Means, Standard Deviations, and Intercorrelations for Study 1

	Mean	Min	Max	$SD_{Between}$	SD_{Within}	ICC(1)	1	2	3	4	5	6	7
1. Slow velocity	.25	0.0	1.0		.43	.00							
2. Fast velocity	.25	0.0	1.0		.43	.00	-.33***						
3. Expectancy-SOP	6.64	0.3	10.0	1.87	.93	.80	-.19***	.18***		-.13	.62***	-.34***	-.33***
4. Frustration	2.62	1.0	5.0	.98	.47	.75	.23***	-.13**	-.23***		-.11	.12	.04
5. Expectancy-SCB	8.11	1.0	10.0	1.85	.83	.81	-.09*	.12**	.33***	-.04		-.08	-.03
6. Utility	2.57	1.0	5.0	.91	.55	.70	.10*	-.15***	-.13**	.20***	.15***		.64***
7. SCB	2.52	0.0	10.0	3.40	1.41	.85	.13**	-.10*	-.04	.13**	.09*	.25***	

Note. Slow velocity and fast velocity are dummy variables with average velocity as the referent. Expectancy-SOP = expectancy if the standard procedure was used. Expectancy-SCB = expectancy if the shortcut was used. SCB = shortcut behavior. Between-subject correlations are shown above the diagonal (147 individuals). Scores were averaged within each person to compute between-subject correlations. Within-subject correlations are shown below the diagonal (588 observations). Scores were centered at each person's mean to compute within-subject correlations. SD_B = standard deviation of between-subjects (i.e., aggregated) variable. SD_W = standard deviation of within-subjects (i.e., centered) variable. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 2

MSEM results for Study 1

	DV = Expectancy-SOP						DV = Frustration						DV = Utility						DV = SCB					
	γ	SE	t	p	LB	UB	γ	SE	t	p	LB	UB	γ	SE	t	p	LB	UB	γ	SE	t	p	LB	UB
Slow Velocity	-.28	.09	-3.19	.001	-.45	-.11	.23	.05	4.98	<.001	.14	.32												
Fast Velocity	.22	.09	2.54	.011	.05	.39	-.06	.05	-1.36	.174	-.15	.03												
Expectancy-SOP													-.10	.03	-3.87	<.001	-.15	-.05						
Frustration													.20	.05	4.23	<.001	.11	.29						
Expectancy-SCB													.14	.03	4.73	<.001	.08	.19						
Expectancy-SOP × Expectancy-SCB													-.02	.02	-.98	.329	-.06	.02						
Frustration × Expectancy-SCB													.09	.05	1.98	.048	.00	.19						
Utility																			.65	.10	6.35	<.001	.45	.85
R²	.04						.06						.10						.06					

Note. n = 588 observations nested within N = 147 participants. Coefficients are unstandardized multilevel regression weights. Expectancy-SOP = expectancy if the standard procedure was used. Expectancy-SCB = expectancy if the shortcut was used. Lower (LB) and upper (UB) bounds are based on the 95% confidence interval around the estimate.

Table 3
Indirect Effects (Study 1)

	Mediation		
	IE	LB	UB
Velocity → Frustration → Utility			
Slow velocity			
Low Expectancy-SCB	.027 *	.001	.062
High Expectancy-SCB	.063 ***	.029	.108
Fast velocity			
Low Expectancy-SCB	-.006	-.026	.005
High Expectancy-SCB	-.016	-.048	.011
Velocity → Frustration → Utility → SCB			
Slow velocity			
Low Expectancy-SCB	.017 *	.001	.042
High Expectancy-SCB	.040 ***	.017	.075
Fast velocity			
Low Expectancy-SCB	-.004	-.017	.003
High Expectancy-SCB	-.010	-.032	.007

Note. 588 observations nested within 147 individuals. SCB = shortcut behavior. Expectancy-SCB = expectancy if the shortcut was used. Low Expectancy-SCB = 1 *SD* below the mean. High Expectancy-SCB = 1 *SD* above the mean. Lower (LB) and upper (UB) bounds are based on the 95% confidence interval around the indirect effect (IE). *$p < .05$, ***$p < .001$.

Table 4
Correlation Matrix (Study 2)

	Mean	Min	Max	SD$_{Between}$	SD$_{Within}$	ICC(1)	1	2	3	4	5	6
							Correlations					
1. Velocity	3.16	1	5	.58	.69	.18	(.88)	.49***	-.35***	.09	-.02	-.16**
2. Expectancy-SOP	3.99	1	5	.66	.60	.38	.54***	(.95)	-.50***	.10*	-.29***	-.45***
3. Frustration	2.29	1	5	.83	.78	.35	-.52***	-.54***	(.93)	-.03	.25***	.48***
4. Expectancy-SCB	3.72	1	5	.97	.65	.58	.11***	.24***	-.15***	(.97)	.36***	.22***
5. Utility	2.53	1	5	.86	.51	.65	-.28***	-.38***	.37***	.10***	(.90)	.64***
6. SCB	2.25	1	5	.83	.56	.58	-.28***	-.37***	.36***	.00	.36***	(.92)

Note. $N = 1614$ observations nested within $N = 395$ individuals. Between-person correlations are shown above the diagonal, and within-person correlations are shown below the diagonal. Scores were averaged within each person to compute between-subject correlations. SD$_B$ = standard deviation of between-subjects (i.e., aggregated) variable. SD$_W$ = standard deviation of within-subjects (i.e., centered) variable. Internal consistency reliabilities were calculated by computing the mean Cronbach's α across all 5 days, and are displayed on the diagonal. *$p < .05$, ** $p < .01$, *** $p < .001$.

Table 5

MSEM results for Study 2

|	DV = Expectancy-SOP						DV = Frustration						DV = Utility						DV = SCB					
	γ	SE	t	p	LB	UB	γ	SE	t	p	LB	UB	γ	SE	t	p	LB	UB	γ	SE	t	p	LB	UB
Velocity	.45	.02	24.72	<.001	.41	.48	-.59	.02	-24.32	<.001	-.63	-.54												
Expectancy-SOP													-.25	.02	-11.10	<.001	-.30	-.21						
Frustration													.16	.02	9.28	<.001	.12	.19						
Expectancy-SCB													.16	.02	9.32	<.001	.13	.20						
Expectancy-SOP × Expectancy-SCB													.06	.03	1.97	.049	.00	.11						
Frustration × Expectancy-SCB													.10	.02	3.97	<.001	.05	.14						
Utility																			.39	.03	15.41	<.001	.34	.44
R²	.27						.27						.25						.13					

Note. n = 1,614 observations nested within N = 395 participants. Coefficients are unstandardized multilevel regression weights. Expectancy-SOP = expectancy if standard procedures are used. Expectancy-SCB = expectancy if shortcuts are used. Lower (LB) and upper (UB) bounds are based on the 95% confidence interval around the estimate.

Table 6
Indirect Effects (Study 2)

	Mediation		
	estimate	LB	UB
Velocity → Frustration → Utility			
Low Expectancy-SCB	-.055***	-.083	-.028
High Expectancy-SCB	-.129***	-.159	-.101
Velocity → Frustration → Utility → SCB			
Low Expectancy-SCB	-.021***	-.033	-.011
High Expectancy-SCB	-.050***	-.064	-.038

Note. $n = 1614$ observations nested within $N = 395$ individuals. Lower (LB) and upper (UB) bounds are based on the 95% confidence interval around the indirect effect. ***$p < .001$.
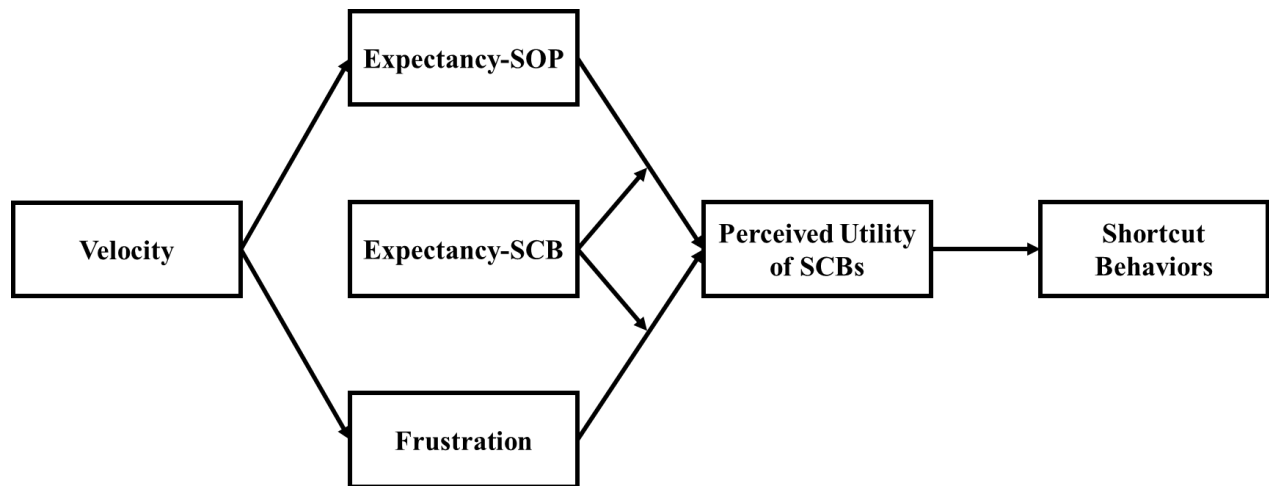
Figure 1. Proposed model. SCB = shortcut behavior. Expectancy-SOP = expectancy if the standard procedure was used. Expectancy-SCB = expectancy if the shortcut was used.
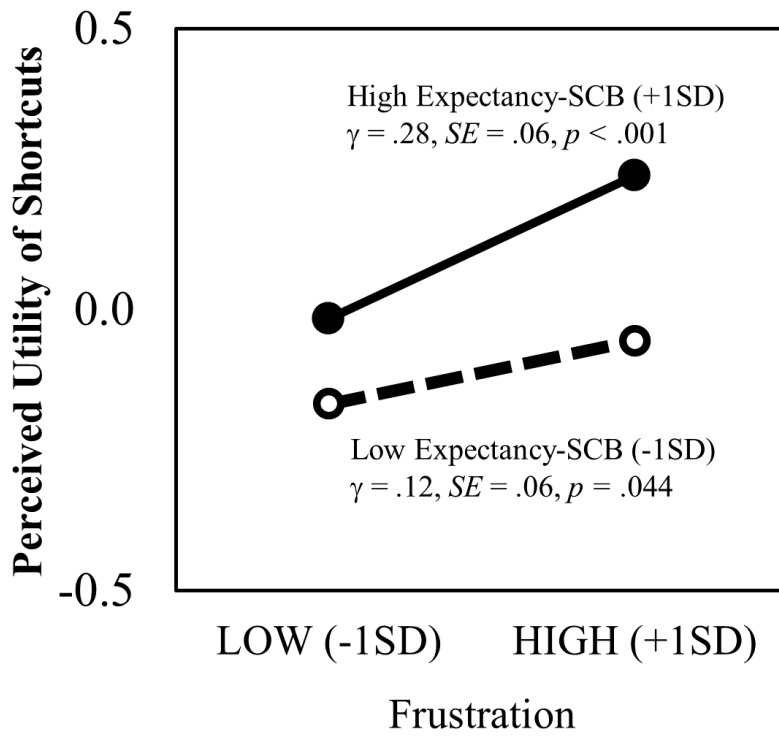
Figure 2. A screenshot of an experimental trial in the work simulation task (Study 1).
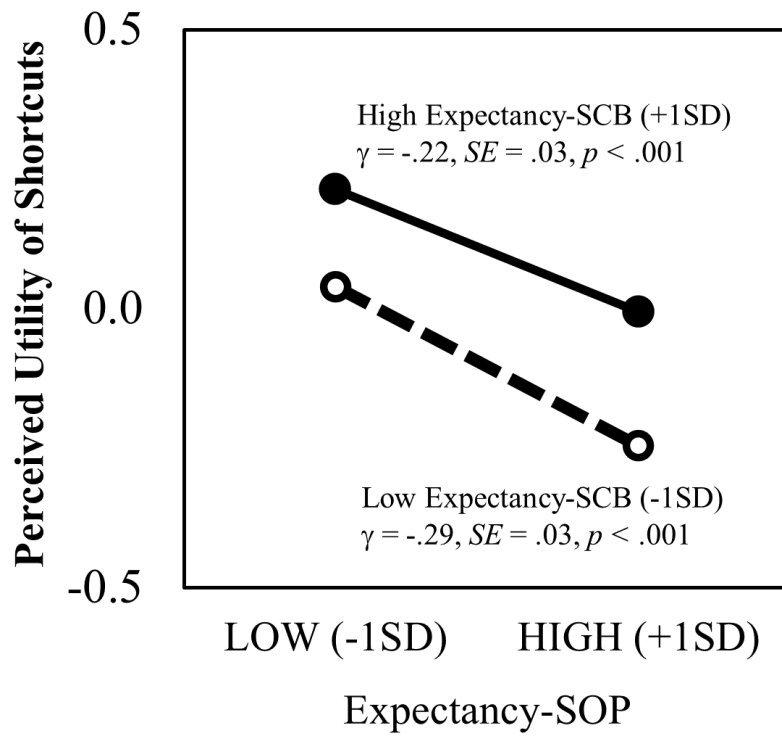
Feedback

Your <u>rate</u> of progress on the batch you just completed was FAST.
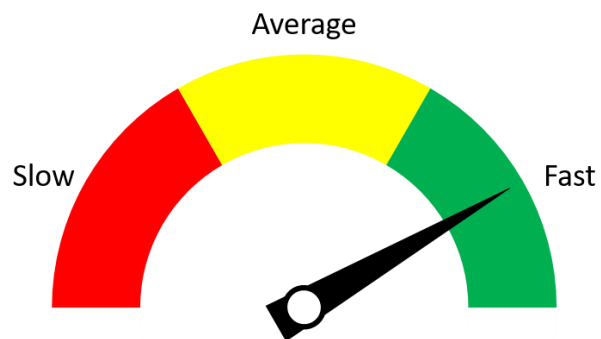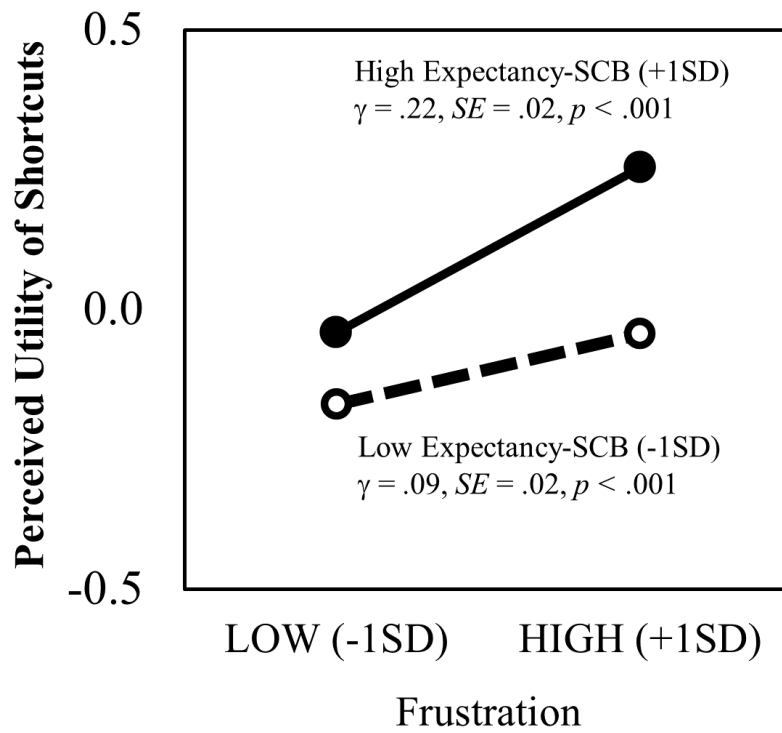

Figure 3. A sample manipulation message (Study 1).

Figure 4. The interaction between frustration and expectancy-SCB predicting perceived utility of shortcuts (Study 1). Because utility was centered around each person's mean, zero refers to the person's mean perceived utility.

Figure 5. The interaction between Expectancy-SOP and expectancy-SCB predicting perceived utility of shortcuts (Study 2). Because utility was centered around each person's mean, zero refers to the person's mean perceived utility.

Figure 6. The interaction between frustration and expectancy-SCB predicting perceived utility of shortcuts (Study 2). Because utility was centered around each person's mean, zero refers to the person's mean perceived utility.