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Adaptation to increased work autonomy: The role of task reflection

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This experiment investigated how individuals adapt to increased work autonomy and examined the moderating role of task reflection. Work autonomy was manipulated in an experimental setting in which participants ($n = 56$) completed a scheduling task. Multilevel analyses demonstrated that participants who began work with low autonomy showed poorer performance when autonomy was increased compared to participants who began with a high level of autonomy. Analysis of thinking-aloud protocols revealed that reflection about task accomplishment had a negative impact on performance among those individuals who worked previously with low autonomy. The data suggest that cognitive capacity limitations and prior task-related knowledge led to the detrimental effects of task reflection on performance when experiencing low autonomy.

Keywords: Adaptation; Autonomy; Task reflection; Self-regulation; Adaptive performance.

Today employees have more autonomy in defining and managing their tasks within organizations (Fried, Hollenbeck, Slowik, Tiegs, &

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Ben-David, 1999; Murphy & Jackson, 1999). Autonomy is an important feature of job design (Fried & Ferris, 1987; Hackman & Oldham, 1975; Humphrey, Nahrgang, & Morgeson, 2007), and is positively related to work-related behaviours, attitudes, and well-being, and negatively related to absenteeism (Fried & Ferris, 1987; Humphrey et al., 2007; Loher, Noe, & Moeller, 1985; Spector, 1986). Studies have also demonstrated that increased autonomy is positively associated with role breadth (Morgeson, Delaney-Klinger, & Hemingway, 2005), role breadth self-efficacy (Axtell & Parker, 2003; Parker, 1998), and personal initiative (Frese, Kring, Soose, & Zempel, 1996). However, it cannot be taken for granted that autonomy is beneficial for performance and satisfaction as theories have proposed (Godard, 2001; Humphrey et al., 2007; Spector, 1986; Wall, Kemp, Jackson, & Clegg, 1986), because some studies also suggest zero and negative effects (Langfred & Moye, 2004).

When autonomy is increased, individuals gain freedom, independence, and discretion in scheduling work and in determining procedures for task accomplishment (Hackman & Oldham, 1975). Increased autonomy might be particularly challenging for individuals who have previously held long-term, highly standardized jobs with strong working routines. To adapt to increased work autonomy successfully, these individuals have to rethink, revise, and overcome their previously learned working procedures that may limit performance and increase passiveness (Karasek, 1979; Parker, 1998). In spite of research that has shown positive as well as negative effects of autonomy on performance and satisfaction, we know little about how individuals adapt to increased autonomy over time. The first aim of this study is to investigate whether persons who previously had low autonomy make full use of their increased autonomy or whether they tend to rely on established working procedures.

When dealing with increased autonomy, individuals have to recognize their new opportunities, think about task-related objectives, processes, and strategies (i.e., reflection), and make decisions about how to perform tasks (Langfred & Moye, 2004). Task reflection can support a deeper understanding of the new opportunities and lead to critical revision of established working procedures (Berardi-Coletta, Buyer, Dominowski, & Rellinger, 1995). However, reflection can also deplete cognitive capacity, leading to performance losses. Thus, it is important to know the conditions under which task reflection aids or limits increased autonomy. The second aim of this article is to explore the role of task reflection in adaptation to increased autonomy.

The present study contributes to previous research on work autonomy in two ways: First, effects of increased autonomy are tested in an experimental setting, which allows for causal conclusions. Second, we examine the role of task reflection as a possible moderator of the relationship of autonomy and performance.

WORK AUTONOMY

In work design theory, autonomy is a central feature of work (Humphrey et al., 2007). Hackman and Oldham (1975) defined autonomy as "the degree to which the job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures used in carrying out" (p. 162). For example, in the Job Characteristics Model, autonomy is a key predictor of workers' motivation. Work autonomy has different facets including scheduling autonomy (i.e., the freedom to control scheduling and timing at work) and methods autonomy (i.e., the freedom to control which methods and procedures are utilized; Jackson, Wall, Martin, & Davids, 1993).

A high level of autonomy is generally thought to be beneficial at work. A recent meta-analysis (Humphrey et al., 2007) showed that autonomy had only small relationships with performance (objective performance: $\rho = .17$; subjective performance: $\rho = .23$), and absenteeism ($\rho = -.15$), but stronger relationships with burnout ($\rho = -.30$), job satisfaction ($\rho = .48$), organizational commitment ($\rho = .37$), and motivation ($\rho = .38$). However, relationships between autonomy and performance are rather small, if not null or negative (Langfred & Moye, 2004).

In the present article we examine how persons adapt to the change from low to high autonomy. We focus on initial adaptation after an increase of autonomy rather than on long-term effects. Low autonomy at work implies that individuals have limited discretion in scheduling work and determining work procedures. Often, low autonomy is accompanied by high task formalization and standardization (Murphy & Jackson, 1999). When tasks are relatively stable, formalized, and standardized over time (Ilgen & Hollenbeck, 1991; Ilgen, Hollenbeck, Johnson, & Jundt, 2005), individuals tend to develop routines (Betsch, Haberstroh, Glöckner, Haar, & Fiedler, 2001; Bröder & Schiffer, 2006; Ouellette & Wood, 1998). A routine is a behavioural sequence that comes to mind as a solution when the individual recognizes particular tasks, problems, or context conditions (Betsch et al., 2001). Routines save time and effort by freeing individuals from constantly deciding and establishing new working procedures (Betsch et al., 2001).

However, extensive research has shown that routines have negative effects on creative thinking (functional fixedness; Anderson, 1995), problem solving (Einstellung effects; Luchins & Luchins, 1959), and adaptation of decision making (Betsch et al., 2001; Bröder & Schiffer, 2006). Routines invoke expectations that do not fit with the actual situation and influence information selection and subsequent behaviour (Feltovich, Spiro, & Coulson, 1997).

Persons under routine might interpret new complex information as simpler than they should by relating it to prior knowledge (Ford, 1997), and might erroneously perceive a novel task as familiar (Gick & Holyoak, 1983).

Accordingly, we argue that individuals with low autonomy develop routines, which make it unlikely that they will instantly adapt to increased autonomy. When these individuals have to reschedule work and decide how to accomplish tasks, they might focus on objectives and weigh task-related information according to the previous routine. Consequently, previous routines inappropriately serve as analogies when new strategies and procedures are being developed.

Furthermore, a stable, formalized, and standardized working environment provides employees with feelings of control over activities, legitimization, organization over activities, guidance, prediction of behaviour, and to provide normative standards for evaluating behaviours (Ashford & Fried, 1988). This makes it likely that employees value work environments that are predictable and comfortable (Brown & Crace, 1996; Rokeach, 1973; Super, 1995). Thus, perhaps individuals are aware of greater work autonomy, but feel comfortable sticking with previously established routines (cf. Frese, 2007, p. 169). They may use satisfying yet suboptimal action strategies when preferring the "next best" procedure (p. 172), rather than putting more effort into developing new strategies and procedures. Thus, we propose the following hypothesis:

> **Hypothesis 1:** Individuals who previously worked with low autonomy will show poorer task performance when autonomy is increased compared to individuals who worked previously with high autonomy.

Furthermore, we expect that individuals adapt to increased autonomy stepwise, and not instantly, by giving up their past behaviours and choosing new ways to cope with tasks. When dealing with increased autonomy, persons recognize their new opportunities and rethink schedules, procedures, and strategies; thus, they have to make decisions regarding how to perform the task *and* to perform the task itself. Based on research on dual-task processing (for an overview, see Evans, 2008), task switching (e.g., Monsell, 2003), and multitasking (e.g., Wickens & Hollands, 1999), Langfred and Moye (2004) proposed that these both tasks compete for and require cognitive capacity. There is evidence that processing tasks which are competing for cognitive capacity interfere with each other (Pashler, 1998; Temprado, Zanone, Monno, & Laurent, 2001). Early in adaptation, demands on cognitive capacity are high because individuals have to explore new opportunities and have to decide about task accomplishment. To deal with limited cognitive resources, individuals may rely, at least in part, on routine behaviours which are less capacity demanding. With growing familiarity, decision making is required less because working strategies becomes clearer (Anderson & Lebiere, 1998). Thus, we expected that performance will increase over time. We propose the following hypothesis:

> **Hypothesis 2:** Over time, task performance will increase for individuals who previously worked with low autonomy compared to individuals who exclusively worked with high autonomy.

TASK REFLECTION

Increasing autonomy means giving individuals more freedom to determine their working procedures and task scheduling (Langfred & Moye, 2004); therefore, particularly those individuals previously in highly stable, standardized jobs with strong working routines have to rethink their well-established processes and strategies when determining how to do tasks under new conditions. Reflection refers to the process of thinking about one's own thinking and behaviour (Berardi-Coletta et al., 1995; West, 1996; Wetzstein & Hacker, 2004) and involves planning, monitoring, and revising goal-related behaviour (Brown, Bransford, Ferrara, & Campione, 1983). It is generally assumed that persons with higher reflection more often critically revise their working processes and are able to develop and implement better task-related strategies (Berardi-Coletta et al., 1995; Keith & Frese, 2005), particularly in learning environments that provide little external structure or guidance (Schmidt & Ford, 2003). However, some evidence suggests that reflection may be detrimental to this process when intensive introspection reduces the quality of decisions (Wilson & Schooler, 1991). As mentioned above, Langfred and Moye (2004) argued that deciding how to accomplish the task requires cognitive capacity. Thus, reflecting intensively should require more cognitive capacity than reflecting less intensively about task accomplishment, and should compete with performance on the task itself. Consequently, intensive task reflection should leave less cognitive capacity for transfer and implementation of revised procedures into concrete action. Thus, individuals may be aware of their newfound autonomy, but when dealing with their limited cognitive capacity, individuals may rely, at least in part, on the established, less capacity-demanding behaviours they practiced before autonomy increased. We propose the following hypothesis:

> **Hypothesis 3:** Task reflection will moderate the negative relationship between low autonomy and task performance such that individuals who worked previously with low autonomy will show poorer performance after increased autonomy when they reflect more intensively compared to individuals with high work autonomy exclusively.

METHOD

Participants

Fifty-six undergraduate students from a German University participated in the study. Mean age was 24.84 years ($SD = 6.43$ years); 91.8% were female. The experiment lasted 2.5 hours. Participants were randomly assigned to the experimental conditions and were given course credit. Seven participants were excluded from data analyses due to misunderstanding of instructions and technical problems. The final sample for all analyses comprised 49 participants (change condition, $n = 22$; no change condition, $n = 27$).

Experimental design

The study used a 2 (change/no change) × 7 (trials) design with repeated measures on the last variable (trials) (see Table 1).

Autonomy was manipulated for accomplishing the same seven trials (change/no change) as a between factor, and trials as a within factor. Each participant performed two phases in the experiment. In the first phase, half of the participants experienced low autonomy when accomplishing the task (change condition); the other half experienced high autonomy (no change condition). In the second phase, both groups accomplished seven trials with high autonomy. Thus, only participants who worked with low autonomy in the first phase experienced an increase in autonomy (change condition).

To check the adequacy of the manipulation, subjective levels of autonomy were assessed. In addition, subjective assessments of task complexity and task motivation were measured.

Experimental task and material

We simulated an advisory service for university students. The cover story instructed participants to encourage other (fictitious) students to finish their studies on time. In both phases, participants were asked to build a schedule for a degree programme for seven students (subjects: architecture and biochemistry). With this schedule, the students should be able to finish their studies in the shortest time possible. Each student represented one trial in

TABLE 1
Design of the experiment

	Trials 1–7	*Trials 8–14*
Change	Low autonomy	High autonomy
No change	High autonomy	High autonomy

the present experiment. The scheduling task was chosen for this study because it was strongly connected to the participants' background. A pilot study was conducted to test the material.

Participants were provided with information about instructions and cover story, descriptions of fictitious students, information about the academic course programmes, the advisory service (courses, tutorials, trainings, and individual consulting), and working procedures.

Description of the fictitious students. Participants received information about the students' current semester, gender, type of degree, credits already achieved, problems with academic subjects (e.g., poor performance in Technical Chemistry), and problems with academic research, writing, and general impairments to motivation. The demands of the scheduling task were comparable across the students. For each student, participants were provided with a booklet containing a course programme for recording their scheduling solutions. Each participant received a randomly determined list of students.

Information about the course programme. For each academic programme, we gave information about which courses must be accomplished in order to achieve a degree.

Advisory service. There were four ways to advise the (fictitious) students. First, students could receive a course schedule that displayed how the academic programme could be finished in the shortest time possible. This kind of counselling was mandatory in all experimental conditions. Second, tutorials for all academic subjects (e.g., Technical Chemistry) could be offered. Third, when students had problems with academic research and skills they could be given the opportunity to participate in one of five trainings (free speech, procrastination, academic writing, academic skills, or application for an employment). Fourth, individual counselling could be offered to reduce general impairments in motivation (e.g., inactivity, depression).

Working procedure. Participants in the experimental conditions received different instructions about how to work through the scheduling tasks (see later).

Experimental manipulation

In both experimental conditions, participants were instructed to advise the fictitious students in how to finish their studies in the shortest time possible, and were given methods that suggested how to accomplish this. Participants were told that each way to advise the fictitious students should contribute to shorten their study time: Tutorials, trainings, and individual counselling were particularly designed to enable fictitious students with problems to study faster. Thus, from the material it became clear that the combination of the four kinds of advice should be the best solution.

We manipulated method autonomy and scheduling autonomy (Breaugh, 1989, Exp. 2) as follows:

Low autonomy. In the low autonomy condition, method autonomy was manipulated by determining (1) the advisory service (building course schedules) and (2) the participants' working procedures (e.g., comparing the course credits which this student has already achieved). Participants were explicitly not allowed to assign tutorials, trainings, or individual counselling to the schedules. Low work scheduling autonomy was manipulated by providing participants 19 minutes in which to complete the first case and 9 minutes for each subsequent case. After each student, participants had to take a 1-minute break. Participants were instructed to stop working only during the rest periods. In sum, they had 90 minutes to work on seven cases.

High autonomy. In contrast, participants with high autonomy had freedom of choice in how to advise students. They had the opportunity to advise the students not only by building course schedules but also by providing tutorials, trainings, and individual counselling. An addition to this freedom, participants were instructed to work through the cases at their own pace. Work scheduling autonomy was manipulated by providing 90 minutes in which participants could spend as much time as necessary for each student. They were provided with the opportunity to allocate themselves a short rest period, if needed.

Procedure

In both phases of the experiment, participants worked in individual sessions with 14 fictitious students (trials). Participants were assigned their tasks, informed about the counselling programme, and given an overview of the information package they needed to complete their work. Participants were instructed to note their advice in the booklet. This included a course schedule. Within this course schedule, individuals had to select the courses and also the specific tutorials, trainings, and individual counselling for the fictitious student. These booklets were analysed for errors (e.g., simultaneous courses) and it was counted how many different advice items participants had chosen.

In the second part of the instructions they were requested to think aloud while working on the task (cf. Sonnentag, 1998). When participants stopped verbalizing for more than 15 s they were prompted by the experimenter to continue. Verbalizations were tape-recorded and later transcribed.

After the thinking-aloud instruction, half of the participants were instructed to advise seven students with low autonomy, the other half was instructed to advise seven students with high autonomy. After having completed this first phase of the experiment, participants were requested to answer questions concerning autonomy, task complexity, and task motivation. Then, participants read the instructions for the second phase of the experiment according to the experimental conditions. Thus, autonomy increased (change condition) for half of the participants whereas the level of autonomy remained the same (no change condition), for the other half of participants. After advising seven students in this second phase, participants had to complete questionnaires concerning autonomy, task complexity, task motivation, and demographic data. At the end, participants were given an interview about the importance of the task for themselves.

Measures

Manipulation check. To test the adequacy of the experimental manipulation, participants' perceptions regarding autonomy were obtained by two scales from Breaugh (1989; Breaugh & Becker, 1987). Three items assessed method autonomy (sample item: "I am able to choose the way to go about my task (the procedures to utilize).") and three items measured scheduling autonomy (sample item: "I have control over the scheduling of my work."). The response scale ranged from 1 = "strongly disagree", to 7 = "strongly agree". Both components of autonomy were assessed immediately following the last student in each phase. In the first phase, reliability estimates for method autonomy and scheduling autonomy were .94 and 93, respectively. In the second phase, alpha coefficients were .75 for method autonomy and .84 for scheduling autonomy.

Performance. The main dependent variable was performance. For each student (trial) we counted whether participants used tutorials, trainings, and individual counselling. The scores ranged from 0 = "no additional advice" to 3 = "use of the three additional advice items" (tutorials, trainings, and individual counselling).

Task reflection. To assess participants' thoughts during task completion, verbalizations were transcribed verbatim. Each phrase (either complete or incomplete) constituted a segment (Sonnentag, 1998). Each segment was classified into one of two categories. The first category was reflection, which included statements reflecting goal setting (e.g., "I have to give him additional support") and planning (e.g., "I will build the schedules first and then I will look for the student's problems"). The second category subsumed statements on the task level that focused on concrete aspects of a schedule itself (e.g., "There are many overlapping courses on Monday morning") and the action participants had just suggested (e.g., "He should take Technical Chemistry on Thursday"). Compared to statements on the task level, reflection focused on what one was doing to perform the task (Berradi-Coletta et al, 1995; Keith & Frese, 2006). The statements were classified by two raters who were trained to use the coding scheme. We calculated Cohen's kappa for segments of the first trial (Trial 8) after the change (no-change) for 16 participants. Cohen's kappa was .96 for the distinction between the two major categories ($n = 1814$ segments). To account for the general amount of statements, the reflective statements relative to the total number of statements was calculated. Random coefficient modelling using HLM (see later) revealed that over the seven trials, the frequency of task reflective thoughts decreased significantly, $\gamma = -0.003$, $SE = 0.0007$, $t = -4.552$, $p < .001$. Thus, the first trial after the change (or no change) of autonomy seems to be most appropriate in capturing task reflection.

We counted the verbalizations of participants for each fictitious student. *T*-tests revealed that the average verbalization tendencies of participants (as indicated by the average number of segments per fictitious student) did not differ between the experimental groups (change/no change), $t(47) = 0.06$, $p = .95$. The average number of segments for a case was 58.96 ($SD = 21.00$).

Additional measures. *Time* (minutes) needed by participants to build a schedule for each case and scheduling errors for each case (trial) was assessed. *Scheduling errors* included missing and simultaneous scheduling of courses. In order to test whether the tasks in all conditions had comparable levels of complexity, *subjective task complexity* was assessed by four items taken from the perceived task complexity scale developed by Maynard and Hakel (1997). Participants responded to a 7-point Likert-type scale ranging from 1 = "totally disagree" to 7 = "totally agree". Internal consistency reliability was .87 in the first phase and .89 in the second phase. We assessed *task motivation* in both phases of the experiment by two items from Maynard and Hakel. Response scale was a 7-point Likert-type scale ranging from 1 = "totally disagree" to 7 = "totally agree". Cronbach's alpha was .71 in the first phase and .86 in the second phase.

RESULTS

Manipulation check

The effect of the experimental manipulations on participants' perceptions on work autonomy, task complexity, and motivation were examined. A 2 (change/no change) × 2 (phase) ANOVA revealed strong evidence of a difference in perceptions of work autonomy as a function of the work autonomy manipulation. As expected, perceptions of autonomy increased when participants who worked in the first phase with low autonomy experienced an increase of autonomy. Perceptions of autonomy remained the same when no change in autonomy occurred (see Table 2), Low/high autonomy × Phase, $F(1, 47) = 84.80$, $p < .001$.

In addition, *t*-tests revealed that task complexity and task motivation did not differ according the experimental conditions: Phase 1 task complexity, $t(47) = 1.32$, *ns*; task motivation: $t(47) = -1.24$, *ns*; Phase 2 task complexity, $t(47) = 0.18$, *ns*; task motivation: $t(47) = -0.16$, *ns* (see Table 2). Thus, effects of increased autonomy on performance could not be explained by task complexity and task motivation.

Preliminary analyses

We first analysed whether participants who experienced an increased autonomy (change condition) needed more time (in minutes) to build a schedule for each student and made more errors compared to participants who worked under high autonomy exclusively (no change condition). A 2 (change/no change) × 7 (trials) ANOVA for the second phase of the experiment revealed a significant interaction between change/no change condition and trial, $F(1, 47) = 2.30$, $p = .04$. As expected, participants in the change condition needed significantly more time for advising the first student of the second phase compared to participants in the no change condition.

The next analysis concentrated on errors for each schedule. Frequencies of double, missing and simultaneous occupancy of courses were counted as

TABLE 2
Means and standard deviations of subjective work autonomy, subjective task complexity, and task motivation

	Change		*No change*	
	M	*SD*	*M*	*SD*
Phase 1				
Subjective work autonomy	3.14	1.40	5.77	1.19
Subjective task complexity	4.60	1.15	5.04	1.15
Task motivation	5.36	1.26	4.93	1.20
Phase 2				
Subjective work autonomy	6.21	0.77	5.70	1.01
Subjective task complexity	4.39	1.33	4.45	1.31
Task motivation	5.05	1.52	4.39	1.43

errors and ranged from 0 to 5 for each student. A 2 × 7 ANOVA for the second phase showed no significant differences in the frequencies of errors between the experimental conditions: change/no change, $F(1, 48) = 2.48$, $p = .12$; trials, $F(1, 48) < 1$, *ns*; Change/no change × Trials, $F(1, 48) = 1.62$, *ns*.

Test of hypotheses

We used a hierarchical linear modelling approach (HLM 6.0) to test our hypotheses (Bryk & Raudenbush, 1992; Snijders & Bosker, 1999). The predictor variables on Level 2 were centred on the respective sample mean. Sample size for Level 1 was $n = 343$, and for Level 2 $n = 49$.

As suggested by Hofmann, Griffin, and Gavin (2000), we first tested a null model that had no predictors at either Level 1 or Level 2. A test of significance of Level 2 residual variance of the intercept, τ_{00}, $p < .000$, was significant, indicating that multilevel model use is appropriate. The ICC was .58, indicating that 58% of the variance resided between persons (likewise, 42% within persons).

To test the study's hypotheses, we predicted participants' performance in the second phase of the experiment. We compared five nested models (Table 3).

The first model was the null model, which included only the intercept as predictor. In Model 1 we entered the variable trial at Level 1. Model 2 included the predictor variables change/no change reflection (Level 2). In Model 3 we tested the cross-level interaction between change/no change and trials. In Model 4 the interaction between change/no change and reflection (Level 2) was entered. Table 3 displays the results for the dependent variable performance.

Hypothesis 1 predicted that participants who changes from low to high autonomy will show poorer performance compared to participants who had high autonomy from the beginning. As expected, Model 2 was better than Model 1, $\Delta - \text{Deviance} = 18.815$, $df = 2$, $p < .001$; change/no change: $\gamma_{01} = -0.535$, $SE = 0.144$, $t = -3.648$, $p < .001$. This means that on average, persons with low autonomy in the past showed poorer performance than persons with high autonomy in both phases. Thus, Hypothesis 1 was supported.

In Hypothesis 2 we proposed that over time, performance will increase for individuals who previously had low autonomy but not for individuals who worked exclusively with a high level of autonomy. Figure 1 depicts the average performance for each trial in Phase 2.

Unexpectedly, the figure shows that participants' performance in the change condition did not increased over the trials. This was supported by testing the cross-level interaction between change/no change and trials with

TABLE 3

Results from hierarchical linear modelling predicting performance from the experimental conditions (change, no change), task reflection, and trials

	Null model			*Model 1*			*Model 2*			*Model 3*			*Model 4*		
	Estimate	*SE*	*t*	*Estimate*	*SE*	*t*	*Estimate*	*SE*	*t*	*Estimate*	*SE*	*t*	*Estimate*	*SE*	*t*
For Intercept B0															
Intercept (B_{00})	1.971	0.084	23.409***	1.971	0.084	23.409***	1.971	0.069	28.363***	1.901	0.089	21.353***	1.901	0.084	22.465***
Change/ no change (B_{01})							−0.535	0.144	−3.648***	−0.621	0.184	−3.383**	−0.621	0.174	−3.579**
Task reflection (B_{02})							−0.211	0.082	−2.584*	−0.211	0.082	−2.584*	−0.212	0.058	−3.683**
Change/No change × Task reflection (B_{03})													−0.208	0.060	−3.473**
For trials slope															
Trials (B_{10})				0.017	0.013	1.345	0.017	0.013	0.136	0.017	0.013	1.357	0.017	0.013	1.357
Change/No change × Trials (B_{11})										0.024	0.026	0.915	0.024	0.026	0.915
Deviance		578.409			576.549			557.734			556.848			547.632	
Diff deviance					1.860			18.815***			0.886			9.216***	
Df					1			2			1			1	
Level 1 variance (*SE*)		0.226 (0.475)			0.225 (0.474)			0.225 (0.474)			0.224 (0.474)			0.224 (0.474)	
Level 2 variance (*SE*)		0.315 (0.561)			0.315 (0.561)			0.205 (0.452)			0.205 (0.452)			0.164 (0.405)	

Change/no change was coded as follows: no change = 1, change = 2. Results based on $n = 49$. B_{01} = slope relating change/no change to average performance; B_{02} = slope relating task reflection to average performance; B_{03} = slope relating the interaction between change/no change and task reflection to average performance; B_{11} = slope relating a linear trend in the trials to performance. *$p < .05$, **$p < .01$, ***$p < .001$.

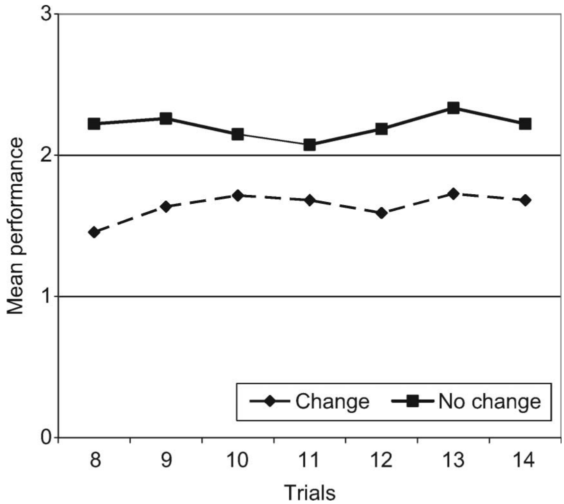

Figure 1. Average performance for the change and no-change conditions over seven trials (8–14) in Phase 2 of the experiment.

HLM in Model 3. The cross-level interaction did not predict performance, $\Delta -$ Deviance $= 0.886$, $df = 1$, *ns*; $\gamma_{11} = 0.024$, $SE = 0.026$, $t = 0.915$, *ns*. Hypothesis 2 was not supported.

Hypothesis 3 stated that the impact of low autonomy on performance will be more negative when participants reflect intensively about the task. As expected, there was significant improvement of Model 4 over Model 3, $\Delta -$ Deviance $= 9.216$, $df = 1$, $p < .01$. The interaction between change/no change and reflection was significantly associated with performance, $\gamma_{03} = -0.208$, $SE = 0.060$, $t = -3.473$, $p < .01$. To examine Hypothesis 3 in more detail, the interaction was plotted (see Figure 2) and the simple slopes for the change/no change performance relationships with a high level and a low level of task reflection were calculated (Cohen, Cohen, West, & Aiken, 2003). When participants worked in both phases with high work autonomy, the level of task reflection did not affect performance, $\gamma = -0.056$, $SE = 0.083$, $z = -0.680$, $p = .497$. In contrast, experience with low autonomy influenced performance under high autonomy more negatively when participants reflected about the task intensively (high level of task reflection), $\gamma = -0.472$, $SE = 0.083$, $z = -5.660$, $p < .001$ (see Figure 2). Thus, Hypothesis 3 was supported.

DISCUSSION

The present study demonstrated that individuals who normally accomplished tasks with low autonomy were aware of the increase of autonomy

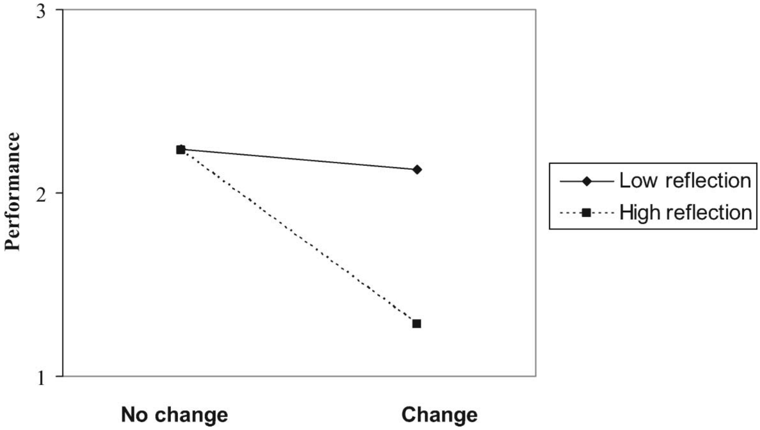

Figure 2. Interaction between change/no-change and task reflection when predicting performance.

but did not make full use of it. Reflection about task accomplishment appears to be not beneficial but rather detrimental for using the newly gained autonomy.

Participants who worked previously with low autonomy preferred the "next best" solution (Frese, 2007), i.e., an advisory service which was similar to the previous service (only course scheduling), rather than putting more effort into an advice item that better meets the demands of the students. This result was not attributable to motivational reasons because we did not find an increase of motivation in Phase 2 due to high autonomy (Langfred & Moye, 2004).

Our hypothesis that performance will increase over the trials was not supported. It seems that during the first trial after the increase of autonomy participants developed a strategy to advise the student which was retained when working on subsequent cases. One may suggest that after the increase of autonomy, cognitive demands were high. Consequently, individuals tended to rely on less capacity demanding yet suboptimal routines. Future research should investigate whether participants stick to their suboptimal routines for a longer time period. In addition, studies have to use other kinds of tasks in order to show whether our results can be generalized. The role of high demands after changes in the work environment, and individuals' limited cognitive capacities have to be investigated more directly.

In line with Hypothesis 3, results revealed that individuals who worked previously with low autonomy performed more poorly when reflecting more intensively about task accomplishment under high autonomy. In order to deal with limited cognitive capacity, individuals may rely on well-established behaviours that are less capacity-demanding.

To sum up, adaptation to increased autonomy is a complex process that includes processes related to overcoming routines, and which is constraint by limited cognitive capacity.

Strengths and limitations

A strength of this study is that we tested individuals' responses to increased autonomy in a controlled laboratory setting, which enabled us to draw causal inferences. Moreover, we obtained verbal protocol data in order to examine the role of reflection. In field studies, data that gives insight into internal cognitive processes is difficult to obtain. In addition, we chose a task that was strongly connected to the participants' background. All participants were convinced that they were testing a new advisory service for university students and reported that they were highly involved with the task.

However, our study also had some limitations. Specifically, findings for students may not be generalized to real work settings. It might be that in real work settings, individuals see more benefits than costs in autonomy, which in turn may positively affect their motivation and performance. Apart from this, we are confident that the effects of the present study are similar or even stronger in realistic work settings. We expect that the negative effect of low autonomy may be even stronger in a realistic work setting because it is likely that individuals work a longer time with low autonomy. Thus, cognitive and motivational drawbacks of routines may be much stronger than in a laboratory setting.

A second limitation is that the majority of the participants were female. One can suggest that there may be gender differences in autonomy preferences, utility, and performance effects. Future studies should test whether gender moderates the relationship between increased autonomy and performance.

A third limitation of the present study was that we focused on short-term effects of autonomy and task reflection on performance. Thus, we cannot rule out that in the long run participants increasingly make more use of their newly gained autonomy.

Implications

The results of this study have several implications. First, coaching in more autonomous jobs is likely to be especially beneficial for those who have worked with low autonomy and who are likely to be limited by their prior experiences (Parker, 1998). Second, the present study demonstrated that in the early stage of adaptation to increased autonomy, individuals develop procedures which are temporarily retained. Especially at the start of adaptation, individuals may develop maladaptive working routines

(Frese, 2007) with which they feel comfortable. Thus, interventions should help to continuously revise individuals' performance after autonomy has changed because, as research revealed, it is not easy to overcome routines (Luchins & Luchins, 1959). Third, the study showed that task reflection was negatively related to adaptation to increased autonomy. We certainly do not suggest that people should studiously avoid all reflection before making decisions and developing new working procedures. However, in order to reduce the negative effect of task reflection, it might be supportive to reflect together with other persons who have different task-related experiences. Then, individuals might be less stuck in their "mental cave". The beneficial role of group reflection on task objectives and processes has been empirically demonstrated (Gurtner, Tschan, Semmer, & Nägele, 2007; West, 1996).

In sum, from a practical perspective, a key implication of the present findings is that success of increased autonomy will depend on preparing and revising individuals' performance early in work design using a social setting. It then may be more likely that the positive aspects of task reflection, such as supporting the revision of working processes, will outweigh its costs.

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