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ORIGINAL PAPER

The contextual effect of completion on the effectiveness of performance feedback

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Abstract

This study investigates the varying effect of performance feedback on performance, depending on the task context. Specifically, we analyze the state of completion (of a product or process) as an essential dimension of the task context. Using a laboratory experiment, we predict and find that performance is lower under completion than under non-completion. Further, we predict and find that the effect of performance feedback on performance differs depending on the state of completion. Specifically, performance feedback increases performance under completion. However, on average, performance feedback is ineffective for non-completion. Our results extend research on the interplay between feedback and contextual factors within firms by providing initial evidence of the impact of the state of completion. In addition, our study has important implications for performance feedback design choices.

Keywords Completion · Feedback · IKEA effect · Performance information · Task context

JEL classification C91 · M11 · M41 · M54

1 Introduction

Firms frequently use feedback to motivate employees. Overall, research provides mixed evidence regarding the efficacy of performance feedback (Kluger and DeNisi 1996). One of the reasons for the variations in efficacy is contextual influence

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(Johns 2006). In practice, contextual factors, such as task parameters, vary widely—for example, whether the task allows the employee to complete the product or process. It is therefore critical to explore task characteristics, which can moderate the effect of feedback on performance (Bonner and Sprinkle 2002). While recent feedback research in management accounting manipulates, for example, task complexity (Brown et al. 2016) and the task environment (single task vs. multiple tasks; Hannan et al. 2013), knowledge about the combined effect of feedback and task characteristics is still scarce (Bonner 2008; Nikiforow 2019).

To extend knowledge in this area, this study takes a new approach by considering whether employees are supposed to work on a task that results in the completion of a product or process (hereafter, state of completion) as a task characteristic. In this context, completion refers to a product or process that does not require any further action, whereas non-completion implies that one or more steps still need to be taken until completion. Hence, a non-complete product or process has not yet (fully) satisfied its intended purpose. Whenever a task is characterized by a clearly defined end, the state of completion constitutes a salient task characteristic.[1] While many situations allow employees to complete the outcome of their work, there are also instances in which employees participate in multi-step tasks that require the effort of more than one person to achieve a successful output. Exemplary scenarios of non-complete products or processes comprise products or processes that are too time-consuming or too complex to be completed by one employee alone, such as assembly line work, advertising campaigns, annual reports, audits, or budget planning. The state of completion of products and processes often results (un)intentionally from the organizational structure, determined by factors such as firm size, organizational capabilities, and the distribution of responsibilities.

In this study, we examine the joint effect of the state of completion and performance feedback on performance. Understanding the combined effect is important because firms commonly provide employees with feedback information on task performance, even if the task constitutes just one step of a multi-step process. To this end, organizations voluntarily or involuntarily collect and communicate quantitative performance information of (non-)complete products and processes at various stages. As such, International Accounting Standard (IAS) 2 requires firms to disclose work in process inventories and finished goods inventories. However, firms do not only gather performance information of non-complete outcomes for regulatory purposes. For instance, besides annual performance appraisals, firms often deploy interim performance appraisals that discuss the status of non-complete processes (Ederer 2010). In summary, it is common practice that firms document and process performance information on complete and non-complete outcomes.

Prior literature highlights that the state of completion has a decisive impact on individuals' evaluation of their task and self-evaluation (Mochon et al. 2012; Norton et al. 2012). Specifically, the completion of a product is associated with an

[1] In particular, the state of completion is especially prominent in settings with clearly structured and outlined tasks. Conversely, if tasks are highly ambiguous or are subject to a high degree of uncertainty, the state of completion is less pronounced.

overvaluation of the outcome that results from positive affective reactions such as emotional attachment and feelings of competence. Research using one-time tasks demonstrates that overvaluation is reflected in a higher willingness to pay. In this study, we extend this research stream by examining whether the state of completion affects the performance level of individuals in a routine-task setting. Investigating routine tasks is important, as they represent the largest portion of daily business in organizations (Brüggen et al. 2018; Tate 2012).

Our first hypothesis concentrates on the isolated performance effect of completion. In contrast to the aforementioned effect of overvaluation on customers' willingness to pay, which is beneficial to the firm, we expect that the overvaluation resulting from completion yields an adverse performance effect in the absence of performance feedback. This effect arises because completion positively affects individuals' assessment of and satisfaction with their own performance, such that they are more likely to become complacent when working repeatedly on the same task (Berger et al. 2013; Norton et al. 2012). Completion thus leads to detrimental consequences for individuals' task-specific personal goals (Locke 1996). Building on this reasoning, we further argue that the state of completion interacts with the way feedback is processed and acted upon. Particularly, we expect that the state of completion affects both the directing and motivating functions of feedback because individuals are more inclined to interpret their feedback as meaningful when they are completing products or processes. In such situations, individuals appreciate performance feedback on their work and are likely to increase their performance. Under non-completion, performance feedback is expected to be less effective because information associated with less positive feelings has limited relevance for individuals.

To test our predictions, we conduct a 2×2 between-subjects laboratory experiment in which participants can choose to spend productive time on an origami folding task or non-productive time on alternative activities. We manipulate two factors: performance feedback (performance feedback vs. no performance feedback) and the state of completion (completion vs. non-completion). Thus, participants either receive or not receive performance feedback upon production of a completed or non-complete origami model. To assess the effect on performance, we use the number of correctly folded origami models as our dependent variable.

The results are consistent with our predictions. Specifically, our experimental results provide evidence that participants' performance is significantly lower under completion vs. non-completion, given the absence of performance feedback. Further, we find an interaction effect between completion and feedback. Under completion, performance feedback increases individuals' performance significantly. By contrast, performance feedback is, on average, ineffective for participants who are not allowed to complete the product. Thus, we provide evidence that the state of completion moderates the effectiveness of performance feedback.

Our study provides important implications for the literature and practice. First, by showing that the effect of feedback depends on the state of completion, we advance research that has investigated the interplay of task characteristics and feedback, thereby adding new insights to the discussion on the effectiveness of feedback (e.g., Brown et al. 2016; Buchheit et al. 2012; Hannan et al. 2013; Kluger and DeNisi 1996). Likewise, our study informs management accountants regarding the

appropriate design of performance feedback to encourage employee effort and performance. Specifically, when providing feedback, management accountants could take into account whether the product/process to be assessed is complete. In this sense, we identify outcome feedback, which usually comes at low cost and low time consumption, as an efficient mechanism that can be used to mitigate the negative consequences of completion. We also show that outcome feedback is less effective under non-completion—a finding that is particularly notable, since in many cases, it is necessary or beneficial for organizations that employees work on non-complete products or processes. Hence, if the task features a non-complete product or process, firms may reconsider using (sophisticated) feedback mechanisms due to lack of benefit. Second, we extend prior literature on (emotional) reactions to self-creation and completion (Dohle et al. 2014; Franke et al. 2010; Marsh et al. 2018; Mochon et al. 2012; Norton et al. 2012). In particular, our study contributes to this literature stream by showing that positive affective reactions induced by completion, such as feelings of competence, can negatively impact performance in repetitive tasks. Understanding how completion affects performance is important, as this task characteristics is often observable and sometimes even controllable by firms.

The paper is organized as follows. Section 2 provides relevant background on performance feedback and goal setting, as well as completion and overvaluation, before developing the hypotheses. The experimental design is presented in Sect. 3. Section 4 presents the results of the empirical analysis, and Sect. 5 provides the conclusions.

2 Background and hypotheses

2.1 Performance feedback and goal setting

Performance feedback provides information about the recipient's performance aspects (Kluger and DeNisi 1996). Feedback primarily serves two functions (Bannister 1986). First, feedback directs employees' attention to specific elements of their task (Ilgen et al. 1979), thereby helping focus their efforts on desired outcomes by indicating whether their performance is in line with expectations and by clarifying their role (Hall 2008; Reichheld 2006). Second, feedback motivates individuals because it enables recipients to observe and reflect on the outcome of their actions. Additionally, feedback promotes learning if it provides cues to detect erroneous behavior (Ammons 1956; Kluger and DeNisi 1996).

According to goal-setting theory, goals and intentions are viewed as immediate precursors and regulators of many, if not most, human action (Locke and Latham 1990a; Locke 1968; Ryan et al. 1996). Similarly, the goal-setting literature suggests that the impact of feedback on performance depends partially on the goals individuals set for themselves after receiving feedback (Butler and Winne 1995; Pritchard et al. 1988). Feedback can thus stimulate individuals to set (consecutively higher) personal goals. If these feedback-based goals are sufficiently challenging, they contribute to a positive motivational effect and thus, increase performance (Bandura and Locke 2003). Goals (and intentions) thereby mediate the relationship between

feedback and performance. Additionally, feedback that reveals progress is considered important for goals to increase performance (Erez 1977; Locke and Bryan 1969; Lord and Hanges 1987). In particular, knowledge of performance helps to focus on goal attainment and provides a standard that individuals can aspire to exceed. Feedback thus moderates the relationship between goal setting and performance.

However, the effect of feedback and consequently, feedback-based goal setting highly depends on the type of feedback, context, and individual attributions, which then affect how individuals respond to feedback. It is therefore not surprising that findings regarding feedback efficacy are highly variable, although a large body of literature has investigated the effect of feedback on motivation, effort, and performance (Alvero et al. 2001; Balcazar et al. 1985; Kluger and DeNisi 1996; Ilgen et al. 1979). Kluger and DeNisi's (1996) meta-analysis concludes that the effect of feedback on performance is equally likely to be positive, negative, or neutral. For example, outcome feedback is found to be effective for performance evaluations, financial statement accuracy, and bond-rating evaluations (e.g., Harrell 1977; Hirst et al. 1999; Nelson 1993), but appears ineffective in other settings (e.g., Buchheit et al. 2012; Frederickson et al. 1999). This highlights the importance of examining contextual factors that could affect the feedback–performance relation.

One factor of theoretical and practical importance is the task context. Previous feedback research in this area has focused on task complexity (Brown et al. 2016; Buchheit et al. 2012; Leung and Trotman 2005, 2008) and task dimensions (multi-dimensional vs. one-dimensional tasks) in a single-task environment (Christ et al. 2016) or multi-task environments (Hannan et al. 2013, 2019). Overall, these studies confirm the importance of considering the task context when examining feedback effectiveness. However, only Brown et al. (2016), Hannan et al. (2013), and Leung and Trotman (2005) explicitly manipulate the task context.

Our study adds to this literature by showing that the effect of feedback depends on one of the elements of task context, namely, the state of completion. Specifically, we argue that completion potentially determines individuals' evaluation of the task and their behavior, making it a critical factor in determining the effectiveness of performance feedback.

2.2 Completion and overvaluation

Completion is the action or process of finishing something (Oxford Dictionary 2019). Accordingly, product/process completion is the state in which the entire product/process is finished. To reach this state, individuals are required to perform a certain process until the end. When completed, the product/process can be identified and applied to its specific purpose. By contrast, a non-complete product/process is in a state that lacks something and thus, requires one or more steps to be finalized. Moreover, a non-complete product/process may not be identified with certainty and may not yet be (fully) applied to its intended purpose(s). In practice, many tasks allow individuals to perform the entire process leading to a successful outcome. For instance, a single auditor may be able to perform the entire audit of a micro enterprise. However, many tasks are too complex or uneconomical to be

handled by a single employee. Thus, firms manage these tasks by establishing multi-step processes involving several employees. For example, an audit of a multinational group is usually divided among several staff auditors. Simultaneously, this implies that not every employee is allowed to complete the final product or process. Similar examples can be found in production environments such as assembly line production. Although exogenous factors (e.g., complexity) frequently determine the assignment of complete or non-complete processes, the assignment of tasks that feature either completion or non-completion may also be an intentional design choice for an organization.

Recent research stresses that successful completion is responsible for an increase in the valuation of self-made products or processes, a phenomenon known as the IKEA effect (Norton et al. 2012). Specifically, consumers exhibit greater willingness to pay for self-made products than for identical products that have been produced by someone else, even if the self-crafted product is of inferior quality (e.g., Franke et al. 2010; Norton et al. 2012). Since effort is considered costly, preferring self-made products over ready-made products incurs extra costs, which should intuitively lower the willingness to pay. Remarkably, the higher willingness to pay as demonstrated by the literature suggests the opposite and points to an overvaluation of the self-made product. For example, in an experimental study, Norton et al. (2012) asked participants to assemble a standardized IKEA storage box or hedonistic items such as a Lego car or an origami model. Regardless of the product type, the participants exhibited greater willingness to pay compared with the willingness to pay of third-parties and also compared with their own willingness to pay for identical but preassembled products. Further, the authors find no increase in valuation among participants who processed incomplete products or deconstructed the products after successful completion, in contrast to completed products. Similar results have been found for the digital customization of products (Franke et al. 2010), food preparation (Dohle et al. 2014), and handmade products (Fuchs et al. 2015).

According to these studies, overvaluation can be attributed to several underlying mechanisms, which are less pronounced or even nonexistent in the case of non-completion. First, working on a product or process requires individuals to exert effort, regardless of completion. Accordingly, with effort justification, the more effort individuals invest, the higher they value the outcome (Festinger 1957). Therefore, the effort invested adds emotional attachment to the self-crafted product if individuals perceive the invested effort as effective (McGraw et al. 2003). However, the absence of perceived success resulting from non-completion makes emotional attachment less likely to arise. By contrast, completion reveals the ability to attain the desired outcome successfully and is therefore considered a critical means to feel competent (Bandura 1977). Indeed, while the process of completing a product/process might not necessarily be enjoyable, the act of finalizing it generates positive emotions such as feelings of competence (Mochon et al. 2012). Successful completion of a product/process thereby signals competence to oneself and to others, indicating a valued identity and simultaneously raising self-efficacy (Bandura 1977; White 1959). Further, Mochon et al. (2012) show that individuals who strive to affirm themselves are more inclined to engage in self-creation. Collectively, the overvaluation of self-made, completed products/processes is a combined result of effort justification and

feelings of competence resulting from successful completion. Thus, the absence of one of the two criteria will potentially prevent overvaluation.

2.3 Hypothesis development

2.3.1 Effect of completion on performance

Our first hypothesis considers the impact of completion on performance in a setting without a regulating or directing mechanism. Drawing on the IKEA effect, we argue that the completion of a product[2] provides individuals with a positive affective experience and increases emotional attachment for having exerted a considerable amount of effort (Ariely et al. 2005). While individuals tend to be effort-averse, recognizing that they have completed a product or process leads them to value their experience in retrospect. In line with the attribution theory, successful completion of a product is causally attributed to one's own ability (Franke et al. 2010; Weiner et al. 1979). Thus, the individual becomes proud of his/her achievement of completing a product. This positive experience serves as a credible signal of competence to oneself and others (Mochon et al. 2012; Norton et al. 2012). In other words, the successful completion of a product acts as a critical means of achieving feelings of competence. Following the self-determination theory (Deci and Ryan 1985, 2000), individuals are motivated by the underlying need for competence, that is, the desire to feel capable in their endeavors. Hence, feelings of competence through completing a product equate to powerful intrinsic rewards (White 1959). Consequently, the perceived utility from finalization (i.e., feelings of competence) could compensate for the individuals' perceived disutility of exerting effort (Buechel and Janiszewski 2013).

Unlike studies on the basic IKEA effect, which demonstrate a higher willingness to pay for self-made products using one-time tasks, our setting asks employees to perform the same task repeatedly. This is particularly relevant, as positive and satisfactory experiences can potentially induce complacency upon repetition (Berger et al. 2013), resulting from overvaluation of the completed product. In this sense, the state of completion (working on non-complete vs. complete products) determines individuals' task-specific personal goals,[3] which refer to the task-specific level of performance desired or sought (Locke 1996), guided by the personal need for competence.

When completing a product, individuals can easily achieve feelings of competence, beginning with their first successful completion. While the initial successful completion largely contributes to attaining feelings of competence, the marginal benefit of the completion of each additional unit (of the same product) decreases considerably, since individuals do not have to reaffirm themselves within the same context (Vancouver and Tischner 2004). In other words, by achieving feelings of

[2] There is reason to believe that our study results are transferable to processes, since our setting is not vastly different from working on complete self-contained processes compared with incomplete fragmented processes. Hereafter, we refer to completion or product completion to improve readability. However, when we refer to completion or product completion, this also applies to process completion.

[3] We follow Locke and Latham (1990a) and refer to personal goals to distinguish from assigned goals.

competence, individuals become mainly satisfied with their initial performance because these feelings act as a reference standard for satisfaction (Locke and Latham 1990b). Completion thus leads individuals to become satisfied earlier on and to set themselves rather low consecutive task-specific goals, which erodes their total performance (Amir and Ariely 2008; Vancouver et al. 2001). Additionally, it is unlikely that task-specific personal goals, as well as performance, increase significantly over time, assuming that individuals experience satisfaction with their initial accomplishment and perceive little value in achieving a higher quantity (Podsakoff and Farh 1989). Rather, it is likely that the ensuing satisfaction will direct individuals' attention to other activities (e.g., off-task activities), resulting in poorer quantitative performance (Phillips et al. 1996). Consistent with this reasoning, Mochon et al. (2012, p. 368) suggest that increased positive affect stemming from product completion potentially lead individuals to "leave utility on the table" by generally choosing to relax instead of exerting more effort.

By contrast, working on non-complete products involves lower positive affect from the beginning (Mochon et al. 2012). Consequently, feelings of competence are less likely to arise. Given a constant number of products, individuals working on non-complete products experience a significantly lower level of competence than those working on complete products. Hence, dissatisfaction about one's performance in processing non-complete products provides incentive to take action (Bandura 1991). More precisely, to achieve a satisfactory level of competence and self-satisfaction, individuals strive for a higher quantity of non-complete products, which is necessary to develop a sense of competence, such that both the task-specific personal goal and level of performance increase. By attaining high quantity-related goals, individuals can compensate for the lack of feelings of competence that would generally arise when working on complete products.

In summary, we expect the state of product completion to influence individuals' emotional attachment and feelings of competence, thereby affecting their desire to achieve higher quantity, which in turn results in a corresponding performance. Note that we do not imply that potential quantitative changes are accompanied by a corresponding qualitative deterioration. Thus, we propose the following hypothesis:

H1: In the absence of performance feedback, performance is lower under completion than under non-completion.

2.3.2 Performance feedback and the state of completion

In this section, we consider the effect of performance feedback when individuals work on either complete or non-complete products. To understand the effects of performance feedback on (non-)complete products, it is important to assess separately the directing and motivating functions of feedback.

Generally, performance feedback draws individuals' attention toward a specific outcome. For example, if feedback emphasizes quantitative performance, individuals will likely concentrate on performance quantity as their focal goal. Recall that, in the absence of performance feedback, individuals working on complete products are unlikely to set high quantity-related goals. Providing individuals with feedback

on the number of completed products increases their propensity to pursue a specific quantity-related goal. Therefore, we assume that the attention-directing effect of feedback leads individuals who work on complete products to update their goal focus toward quantity and redirect their efforts accordingly (Bandura 1991).

Additionally, from a motivational perspective, performance information induces effort. However, individuals are selective in their use of performance information and subsequent actions (Locke and Latham 1990a). Accordingly, the effectiveness of performance feedback depends highly on the individual's interpretation and evaluation of the respective information (Locke 1968; Tesser 1988). Performance information will only motivate higher effort if employees consider the performance feedback as meaningful. For example, Sansone (1986) shows that performance feedback enhances interest in tasks only if the corresponding tasks are perceived as meaningful. Likewise, Mahlendorf et al. (2014) find that individuals feel supported by relative performance information only if the feedback information is interpreted as relevant. We expect the state of completion to serve as an indicator of whether the employee will perceive the information as meaningful and thus, determine the effectiveness of performance feedback. As noted in H1, the completion of a product represents a valuable outcome and conveys feelings of competence. By emphasizing the number of completed products, performance information has proven to be valuable to employees. Consequently, performance feedback is perceived as meaningful for an individual's self-concept and thus considered relevant (Tesser 1988). By observing one's own progress toward reaching self-set goals, feedback strengthens effort–performance expectancy, thereby encouraging individuals to set more challenging goals for themselves. Hence, providing meaningful feedback on the progress of work on complete products allows individuals to develop a desire to surpass their previous performance levels, such that they actively compete with themselves (Locke 1996). Consistent with this notion, VandeWalle et al. (2001) show that positive feedback leads to higher subsequent self-set goals.

Considering these arguments, we predict that in a setting where individuals work on complete products, performance feedback is likely to increase performance and help overcome complacency induced by product completion (Deci 1972a). Therefore, we posit the following hypothesis:

H2: Performance feedback increases performance under completion.

We expect that the positive effect of performance feedback does not (fully) translate to settings where individuals work on non-complete products, and feedback is provided on their performance. More precisely, providing performance feedback to individuals working on non-complete products is likely to have a lower impact for at least two reasons.

First, with regard to the directing function of feedback, working on non-complete products with feedback leads the individual to concentrate on performance quantity—just as working on non-complete products without feedback does. In other words, when working on non-complete products, employees' attention is directed toward quantity-related goals, regardless of the availability of a feedback mechanism, which renders feedback redundant and with no additional effect.

Second, although performance information still indicates task progress when working on non-complete products, the individual's interpretation and evaluation of

the performance information can differ substantially between the states of completion. As discussed before, non-completion only provides weak signals of achievement or accomplishment to oneself. Accordingly, working on non-complete products appears less enticing and leads to a lower valence (intrinsic attractiveness) because of lower or lack of feelings of competence (Vroom 1964; Wahba and House 1974). With respect to the lack of motivation when abandoning a product before its completion, it is expected that an individual will perceive performance information as less valuable. As a result, the motivating effect of performance feedback is attenuated. It could be that allowing individuals, through performance feedback, to observe more directly that their actions influence performance still has some value in terms of motivating performance. Alternatively since the feedback is considered less meaningful, performance feedback may also be perceived as pointless. In other words, if the performance information is not relevant to the individuals' self-concept, the feedback recipient is likely to reject the feedback (Ilgen et al. 1979). As a result, feedback appears ineffective in improving performance. If the performance information only emphasizes the progress of a less enticing task, performance feedback may even lead to demotivation of individuals. Given that individuals work on non-complete products that convey little feelings of competence, performance feedback carries the risk of the negative motivational effect becoming more salient to individuals. That being the case, the performance information may even be perceived as annoying (Mahlendorf et al. 2014) and thus, cause dissatisfaction and demotivation. As a result, the performance of individuals may suffer in response to performance feedback.

Taken together, individuals interpret information provided by performance feedback as beneficial and performance-enhancing if the feedback highlights positive feelings such as feelings of competence after successfully completing a product. Conversely, individuals perceive lower value if the feedback only highlights the work without being linked to positive feelings after succeeding the task. Therefore, we expect the state of completion to determine the effectiveness of performance feedback. Following these arguments, we can clearly predict that the effect of performance feedback under completion increases performance to a greater extent than under non-completion, as expressed in the following hypothesis:

> **H3:** Performance feedback increases performance at a greater extent under completion than under non-completion.

Figure 1 provides a graphical representation of the hypotheses.

3 Method

3.1 Experimental design and task description

To test our hypotheses, we use a 2×2 between-subjects experimental design. We vary each independent variable at two levels, that is, performance feedback (performance feedback vs. no performance feedback) and the state of completion (completion vs. non-completion). We randomly assign participants to one of the four conditions.

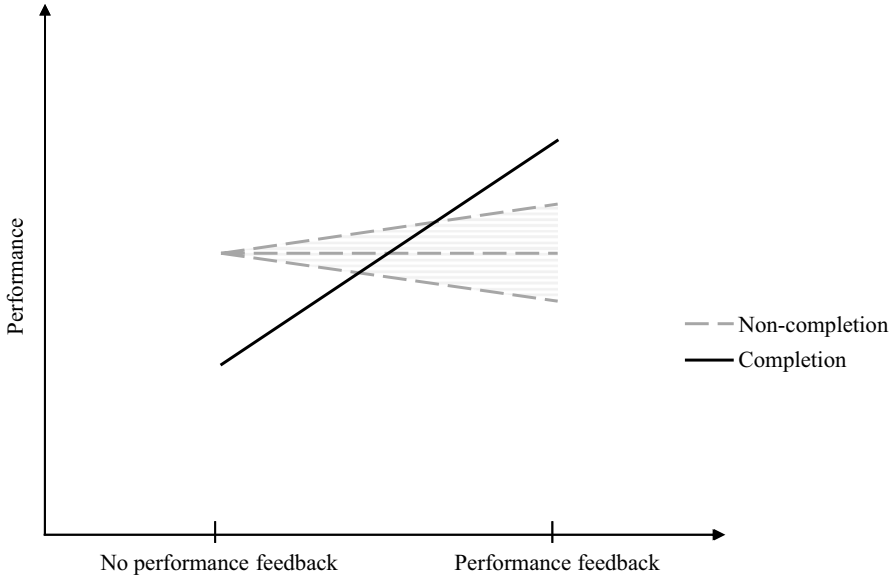

Fig. 1 Predicted effects of performance feedback and the state of completion on performance. Figure graphically represents the predicted effects of the presented hypotheses. Refer to Table 1 for definitions of variables. H1 predicts that in the absence of performance feedback, performance is lower under completion than under non-completion. H2 predicts that performance feedback increases performance under completion. H3 predicts that performance feedback increases performance at a greater extent under completion than under non-completion. We have no theoretical basis to clearly predict whether performance feedback under non-completion has a positive effect on performance, albeit lower than under completion; has no effect; or even a negative effect. Therefore, the indicated range represents the uncertainty about the slope

The underlying task is a modified version of the origami folding task employed by Norton et al. (2012). Participants are asked to fold origami models according to the folding instructions provided. Unlike the original task, in our setting participants are asked to perform the task repeatedly and to produce the products for someone else instead of for themselves. Thus, we explicitly instruct participants that they cannot keep their origami models.

Several reasons suggest that the origami folding task provides a good test of our theory. As demonstrated by Norton et al. (2012), the task appears appropriate in inducing the basic overvaluation effect. Just like assembling IKEA furniture, origami folding requires participants to follow multiple well-structured steps. Hence, the task is reasonably complex, allowing effort justification to arise. Further, the task design enables a precise distinction between completion and non-completion, which, according to Mochon et al. (2012), is a key element in establishing feelings of competence. Simultaneously, the task design satisfies the requirement that the level of difficulty and thus, the effort required to produce a single unit is constant across conditions. In addition, paper folding is an intuitive technique that is familiar to a wide range of the population and can be easily applied in a relatively short time (Morgan 2014). Thus, we consider task

performance a good proxy for effort intensity. Overall, the origami task mimics many real-world settings that contain repetitive, well-structured tasks with clearly defined ends.

Participants are given 60 min net production time to fold as many origami models as they like. They receive a flat-rate payment of €15. We create an environment that enables the participants to freely choose whether to engage in the task or spend time on an alternative activity. For this purpose, we provide a selection of magazines (see Deci 1971, 1972a, b) and a Wi-Fi access password on the table of the experiment rooms. The experimental instructions explicitly permit the use of magazines and Wi-Fi. In doing so, effort is perceived as costlier, and the individual can be distracted by alternative activities. To avoid any influence through monitoring, each subject is left alone in a room; thus, the participants typically believe that the experimenter is not going to know whether they choose to work on the folding task (i.e., they exert effort) or opt to spend time on alternatives. Consequently, we assume that if participants show effort toward the folding task despite other opportunities to spend time on and in the absence of additional rewards, they are intrinsically motivated to perform the task (Deci 1972a). We use the number of correctly folded origami models as our measure of the participants' performance quantity.

3.2 Manipulations

We manipulate the state of completion at two levels. Under the conditions of completion, participants are asked to create origami chickens according to the folding instructions provided to them. A pretesting showed that an origami in the shape of a chicken is well suited for our purposes, since folding an origami chicken is reasonably easy to understand and execute. Nevertheless, the task provides an adequate number of folding steps (23) that must be undertaken to complete the product. Thus, multiple products can be finished within the given timeframe.

In the case of non-completion, participants are asked to perform an equal number of steps (23) to fold a non-complete product.[4] The successful execution of these 23 steps leads to an origami model that cannot be identified with certainty as a particular form or animal. We illustrate that eight additional folding steps would be required to complete the product, leading to 31 steps in total. To ensure that the participants perform only the requested number of steps, the last eight steps are blurred and the corresponding task descriptions are blackened.[5] Further, the folding manual explicitly states that the "remaining steps up to completion are not to be carried out by [the participant] and are therefore disguised".

[4] Our primary interest is the performance difference between treatments in response to working on complete versus non-complete products. This requires that the level of effort is constant across conditions. Therefore, we ensured that the participants in the completion and non-completion groups perform the same number of folding steps, with (almost) the same difficulty level, which should equate to an identical progression rate. Consequently, we omitted the possibility that the participants under the non-completion conditions have the option of completing the product.

[5] The disguised steps contain the necessary steps to reverse the deviating folds and create the same origami chicken as in the completion condition.

By holding the number of folding steps constant across conditions, we intend to make performance quantity comparable across conditions. Additionally, to maintain a constant level of difficulty, the majority of the folding steps are the same across conditions. Only the last five of the 23 steps in the non-completion conditions are slightly modified from those in the completion conditions. More precisely, these five steps must be executed in a different order and/or executed backward (e.g., folding the origami model inward instead of outward).

We also manipulate performance feedback at two levels. In the performance feedback conditions, a scoreboard is provided to the participants, and they are instructed by the folding instructions to manually flip the scoreboard each time they have finished the final step 23. The scoreboard thus visibly indicates the number of assembled products at any time. Therefore, the scoreboard allows individuals to receive self-reported task-focused performance information.[6] By contrast, in conditions with no performance feedback, we do not provide a scoreboard and thus, provide no further performance information.

3.3 Participants and experimental procedure

We conducted 136 individual sessions, with up to four sessions in parallel. The participants arrived individually in a waiting room and were randomly assigned to one of four treatment conditions. Experimenter A guided each participant to a separate room, depending on the treatment condition. After a short welcome, the participants were directed to read the experimental and folding instructions within the next eight minutes. The instructions informing the participants about the experimental procedure were placed on the table in front of each participant, together with the folding instructions, a pencil (required for task processing), an envelope with the individual participation code, a selection of magazines, and a Wi-Fi access password. Except for the folding instructions and the scoreboard (absent vs. present), the materials did not vary between conditions.

Next, after ensuring that the participants understood the instructions, they were provided with high-quality colored origami paper. The same amount of folding paper was provided to each participant. Experimenter A then informed the participants that (s)he would not return, so that there were no further interactions with experimenter A.[7] As indicated by the instructions and experimenter A, the participants had 60 min to complete as many origami models as they wished after the experimenter had left the room. To help the participants keep track of time, a clock was placed in each room. After 60 min, the participants had to stop the task on their own, leaving the assembled origami models in the room and moving to another

[6] Kernan et al. (1991) show that the way in which feedback is acquired (i.e., self-generated feedback or external feedback) does not affect subsequent goal setting or performance. Therefore, we expect our theory and the results to be independent of whether feedback is provided internally or externally.

[7] Interpersonal interactions were limited to mitigate potential demand effects and reciprocal behavior.

room, as described in the instructions.[8] There, experimenter B instructed the participants to answer a set of post-experimental questions. The questionnaire contained manipulation checks, theory-related questions, and items regarding personality, as well as demographic questions. Finally, each participant received a fixed payment of €15 for approximately 85 min of participation.

In total, we recruited 136 undergraduate and graduate students from a large Western European university, enrolled in various majors at the same university.[9] Our final sample includes 129 students. We excluded three participants from our analysis, since they did not follow the folding instructions when performing the task. Further, four participants did not produce a single origami model.[10] According to prior literature (Mochon et al. 2012; Norton et al. 2012), this is critical because the arousal of feelings of competence requires the individual to have experienced the process of completion (or non-completion) at least once to have an effect. Therefore, we generally omit these observations when analyzing our experimental results. However, for our hypothesis testing, we take a conservative approach, reporting the results with and without the nonperformers in parallel.

Of the 129 participants, 58.14% were female, and the mean age was 21.88 years. We examine differences regarding gender, age, and task experience[11] across conditions. Although we do not find significant differences regarding gender ($\chi^2 = 0.11$, $p > 0.99$) or individual experience with handicrafts across conditions ($\chi^2 = 2.07$, $p = 0.56$), we find significant differences regarding age ($\chi^2 = 7.18$, $p = 0.07$). Hence, to control for potential age-related differences that may alter the inferences of our statistical results, we additionally include the participants' age in our analyses following the tests of hypotheses. Further, we control for the participants' majors at the university. We discuss these results subsequent to hypothesis testing.

4 Results

4.1 Validation of the experimental setting

To test whether our manipulation of the state of completion (completion vs. non-completion) was successful, we asked the participants to indicate the extent to which they agree with the statement "The folding instructions consisted of 31 steps, with

[8] If the participants did not stop on their own within a short predefined period of time, experimenter B asked them to quit and change rooms.

[9] The majors the participants indicated are business and economics (68.99%), law (10.08%), computer science (6.20%), engineering (3.10%), linguistics (2.33%), mathematics (1.55%), medical science (1.55%), social science (1.55%), and miscellaneous (4.56%).

[10] These observations are evenly distributed across the four conditions, that is, one in each condition. Therefore, it is unlikely that their decisions were influenced by the manipulation.

[11] Task experience reflects the participants' reported familiarity with handicrafts in general and origami in particular. The items used to measure task experience are as follows: "I do handicrafts regularly," "I am good at handicrafts," and "I was already familiar with origami before this experiment." The participants responded on a Likert scale ranging from one to seven. The factor analysis reveals one factor with an eigenvalue of 2.04 and an explained variance of 67.98%.

the last steps being blurred and task descriptions blackened" on a Likert scale ranging from one (strongly disagree) to seven (strongly agree).[12] The participants in the non-completion conditions indicate significantly higher agreement with this statement (mean = 6.27) than the participants in the completion conditions (mean = 1.45; $t = 21.56$, $p < 0.01$, one-tailed). Further, to evaluate the effectiveness of our manipulation regarding completion, we asked the participants whether they felt that they had completed the product. The participants in the completion conditions were significantly more convinced that they had completed the product than those in the non-completion conditions ($t = 3.46$, $p < 0.01$, one-tailed). Moreover, the participants in the completion conditions rate significantly higher that they were aware of how the final product looks than those in the non-completion conditions ($t = 4.95$, $p < 0.01$, one-tailed).[13]

Further, to validate our manipulation of *performance feedback* (performance feedback vs. no performance feedback), we asked the participants whether they manually flipped the scoreboard each time they finished an origami model. Participants with performance feedback agree significantly more with this statement (mean = 6.18) than participants without performance feedback (mean = 1.05; $t = 25.53$, $p < 0.01$, one-tailed). In addition, the participants were asked to indicate the extent to which they agree with the statement "I measured my performance". The responses to this statement are significantly higher in the conditions with performance feedback than without ($t = 3.08$, $p < 0.01$, one-tailed), validating our manipulation. Taken together, we conclude that our manipulations of product completion and performance feedback were successful.

Moreover, we intended to create a situation in which the participants are free to choose whether to exert effort on the task or spend time on unrelated tasks. We included a manipulation check in the post-experimental questionnaire that stated the following: "I felt free to stop working on the task at any time." The participants widely agree as indicated by a mean response of 5.57, which is significantly higher than the scale midpoint of four ($t = 10.25$, $p < 0.01$, one-tailed) and does not differ significantly across conditions ($\chi^2 = 0.92$, $p = 0.82$), confirming that the participants were aware that they could choose whether or not to exert effort.

[12] A seven-point Likert scale from one (strongly disagree) to seven (strongly agree) was employed for all indicated questions of the post-experimental questionnaire, unless stated otherwise.

[13] Additionally, we asked the participants of our study to gauge on a seven-point Likert scale whether they took the task seriously. The response means are statistically greater than the scale mean of four ($t = 16.60$, $p < 0.01$, two-tailed) and do not differ significantly between the completion and non-completion conditions ($\chi^2 = 4.56$, $p = 0.21$). Moreover, the participants overall agree with the statement "Doing well on the task was important to me." Again, the results do not vary significantly between conditions ($\chi^2 = 1.14$, p = 0.29). This suggests that in none of the conditions did the participants feel like doing a worthless task. Furthermore, we asked the participants to indicate the extent to which they felt like they were productive. Again, there is no significant difference across conditions ($\chi^2 = 0.28$, $p = 0.96$), with a mean response of 4.76. The same pattern applies with regard to the statement "When I look at the paper products I have made, I feel like I was successful" ($\chi^2 = 3.23$, $p = 0.36$).

Table 1 Descriptive statistics by treatment

	No performance feedback		Performance feedback	
	Completion	Non-completion	Completion	Non-completion
Performance	8.66 (6.46) $n=32$	11.14 (5.78) $n=29$	12.89 (5.47) $n=35$	11.06 (6.73) $n=33$
Performance: weak preferences	8.46 (6.04) $n=13$	11.93 (5.23) $n=14$	13.06 (5.73) $n=18$	7.94 (4.82) $n=18$
Performance: strong preferences	8.79 (6.90) $n=19$	10.40 (6.34) $n=15$	12.71 (5.35) $n=17$	14.80 (6.91) $n=15$
Performance (including nonperformers)	8.39 (6.54) $n=33$	10.77 (6.03) $n=30$	12.53 (5.80) $n=36$	10.74 (6.89) $n=34$

Table 1 presents the results of the descriptive statistics: mean (standard deviation) for the dependent variable performance used to test the hypothesis

Variable definitions: *Performance* represents the number of correctly completed origami models within 60 min. *Performance feedback* is manipulated at two levels: performance feedback and no performance feedback. Under conditions with performance feedback, participants are provided with a scoreboard to receive performance information. Under conditions without performance feedback, no scoreboard is provided. *Completion* is manipulated at two levels: completion and non-completion. Under conditions of completion, participants are asked to fold complete origami models by executing 23 out of 23 steps. Under conditions of non-completion, participants are asked to fold non-complete origami models by executing 23 out of 31 steps. Preferences reflect participants' reported affinity for handicrafts in general and origami in particular. Namely, how much participants agree with the statement "I like doing handicrafts" and "I am interested in origami," based on a seven-point Likert scale (1 strongly disagree and 7 strongly agree). Factor analysis reveals one factor with an eigenvalue of 1.41 and explained variance of 70.38%. Factor values that are greater (less) than zero are classified as strong (weak) preferences

4.2 Descriptive statistics

Table 1 reports descriptive statistics for our dependent variable, that is, performance as measured by the number of correctly folded origami models under each experimental condition. As shown in Table 1, participants in the non-completion/no performance feedback condition produced more origami models (mean = 11.14, SD = 5.78) than those in the completion/no performance feedback condition (mean = 8.66, SD = 6.46). These results are directionally consistent with H1. Further, descriptive statistics show that average performance is higher for participants in the completion/performance feedback condition (mean = 12.89, SD = 5.47) than for those in the completion/no performance feedback condition (mean = 8.66, SD = 6.46). This pattern is consistent with our argument in developing H2 that performance feedback helps in overcoming complacency. In the non-completion condition, average performance does not differ depending on performance feedback (no performance feedback, mean = 11.14, SD = 5.78 vs. performance feedback, mean = 11.06, SD = 6.73). Figure 2 presents the descriptive data graphically.

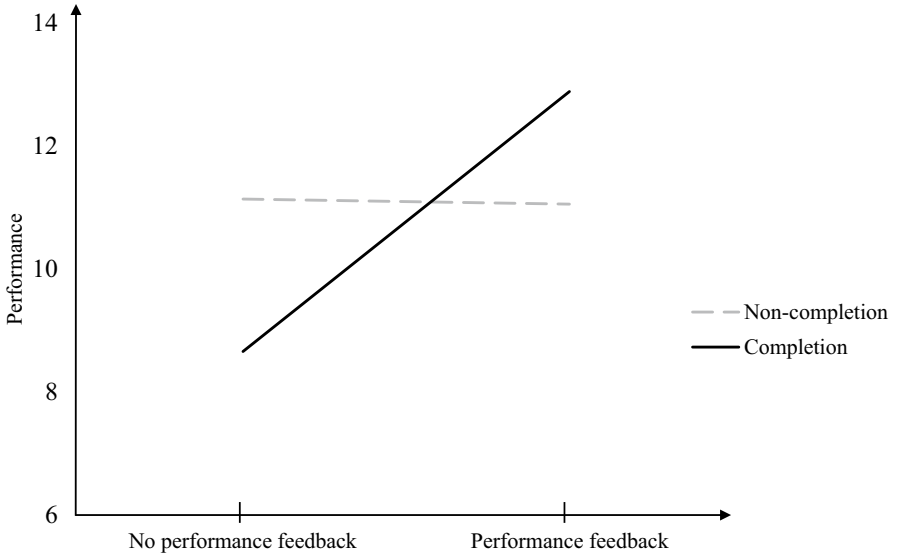

Fig. 2 Observed pattern of results. Figure graphically represents the interactive effect of performance feedback and completion on performance. Refer to Table 1 for definitions of variables

In addition, Table 1 sheds light on whether performance is particularly affected by individuals' preferences for the task.[14] Comparison of the performance within each condition between participants with strong and weak preferences shows no significant difference across conditions (all $t < 0.71$, all $p > 0.49$, two-tailed), except for the non-completion/performance feedback condition ($t = 3.35$, $p < 0.01$, two-tailed). These findings are interesting for two reasons. First, they suggest that under conditions without performance feedback, individuals do not improve (diminish) their performance when they have strong (weak) task preferences. Second, the significant difference in the non-completion/performance feedback condition indicates that performance feedback leads to lower performance when individuals work on non-complete products and have weak preferences, compared with individuals with strong preferences. Although participants' preferences for the task do not differ significantly across conditions ($\chi^2 = 0.32$, $p = 0.32$), we discuss this effect and the potential implications of this finding in Sect. 4.3, after formally testing our hypotheses.

On average, the participants decided to exert effort by folding origami despite having the choice of whether to exert effort. However, four participants (one in each condition) did not produce a single origami model. In our analysis, we primarily concentrate on participants who completed the folding process at least once, as we argue that it is highly important to experience the manipulation and thus the feeling

[14] Preferences reflect participants' reported affinity for handicrafts in general and origami in particular. The exact items are as follows: "I like doing handicrafts" and "I am interested in origami." Factor analysis reveals one factor with an eigenvalue of 1.41 and explained variance of 70.38%.

Table 2 Tests of hypotheses

Source of variation	*df*	Mean square	*F* statistic	*p* value
Panel A: ANOVA ($n=129$)[a]				
Model	3	3.02	3.55	0.02
Feedback	1	3.79	4.46	0.04
Completion	1	0.18	0.21	0.65
Completion × feedback	1	4.82	5.66	0.02
Residual	125	0.85		
			F statistic	*p* value
Panel B: Simple effects tests ($n=129$)[a]				
Effect of feedback within non-completion condition			0.03	0.85
Effect of feedback within completion condition			10.55	< 0.01
Effect of completion within no feedback condition			3.61	0.06
Effect of completion within feedback condition			2.06	0.16
Source of variation	*df*	Mean square	*F* statistic	*p* value
Panel C: Van der Waerden test ($n=133$)				
Model	3	2.76	3.10	0.03
Feedback	1	3.69	4.15	0.04
Completion	1	0.09	0.10	0.76
Completion × feedback	1	4.22	4.75	0.03
Residual	129	0.89		
			F statistic	*p* value
Panel D: Simple effects tests ($n=133$)				
Effect of feedback within non-completion condition			0.01	0.92
Effect of feedback within completion condition			9.24	< 0.01
Effect of completion within no feedback condition			2.94	0.09
Effect of completion within feedback condition			1.85	0.18

Refer to Table 1 for definitions of variables

[a]Dependent variable: square root transformation of participants' performance quantity

of competence after completion. However, one could argue that even the prospect of working on complete or non-complete products is sufficient to influence motivation. Therefore, we report the results of our analyses with non-performers excluded and included. Similarly, the lower part of Table 1 also reports the participants' mean performance, including those who exerted no effort and folded no origami model.

4.3 Hypothesis tests

We first examine whether the prerequisites of the analysis of variance (ANOVA) are satisfied. The Shapiro–Wilk test for normality indicates that participants'

performance does not follow a normal distribution ($W=0.94$, $p<0.01$, $n=129$).[15] Thus, square root transformations of the dependent variable are used for hypothesis testing purposes. To formally test our hypotheses, we run a two-way ANOVA with performance as the dependent variable and performance feedback as well as completion as the independent variables and report subsequent simple effects analyses. The results of the ANOVA and simple effects analyses are displayed in Table 2, Panel A and Panel B, respectively. We repeat the analysis including nonperformers by using an equivalent nonparametric statistical approach: the van der Waerden test. This test has the high efficiency of an ANOVA assuming normal distributions but provides the robustness of the Kruskal–Wallis test assuming non-normal data (Conover 1999; van der Waerden 1952). Following the van der Waerden test, as demonstrated in Table 2, Panel C, simple effects analyses are presented in Table 2, Panel D.

Isolating the completion effect, H1 posits that, without performance feedback, performance will be greater under non-completion than under completion. To test H1 directly, we examine the simple effect of completion in the no performance feedback condition. The simple effect analysis provides marginally significant support that without performance feedback, participants' performance in the non-completion condition is higher than in the completion condition ($F=3.61$, $p=0.06$, Table 2, Panel B). This result supports H1. The test results of the simple effect test following the nonparametric van der Waerden test including nonperformers are inferentially comparable, suggesting that the exclusion of these observations is unlikely to affect the results and add to the robustness of our findings regarding H1 ($F=2.94$, $p=0.09$, Table 2, Panel D).

The ANOVA results ($F=4.46$, $p=0.04$, Table 2, Panel A) and the equivalent van der Waerden test ($F=4.15$, $p=0.04$, Table 2, Panel C) indicate that on average, performance feedback increases performance. This finding is generally consistent with H2, which predicts that performance feedback increases performance under completion. The corresponding simple effect test indicates that participants' performance in the completion/performance feedback condition is significantly higher under completion than in the completion/no performance feedback condition ($F=10.55$, $p<0.01$, Table 2, Panel B). Thus, H2 is supported. The simple effect test following the van der Waerden test including nonperformers supports this finding and adds to the robustness of H2 ($F=9.24$, $p<0.01$, Table 2, Panel D). Additionally, we investigate whether performance feedback affects performance under non-completion. In contrast to the performance-increasing effect under completion, the simple effect test shows no significant difference between the presence and absence of performance feedback under non-completion ($F=0.03$, $p=0.85$, Table 2, Panel B). Thus, it appears that performance feedback is ineffective under non-completion. The corresponding simple effect test following the equivalent van der Waerden test including nonperformers supports this finding ($F=0.01$, $p=0.92$, Table 2, Panel D). In summary, performance feedback improves performance significantly when individuals

[15] Additionally, we test for the assumption of homogeneity of variance. Bartlett's test supports equal variances between treatments for completion ($\chi^2<0.01$, $p=0.96$) and performance feedback ($\chi^2=0.01$, $p=0.91$). Further, Levene's test supports homogeneity ($W=0.46$, $p=0.71$).

Table 3 Interaction between performance feedback and preferences ($n = 129$)

Source of variation	*df*	Mean square	*F* statistic	*p* value
Panel A: ANOVA (completion conditions only, $n = 67$)[a]				
Model	3	2.98	3.41	0.02
Feedback	1	8.81	10.09	< 0.01
Preferences	1	< 0.01	< 0.01	0.99
Preferences × feedback	1	< 0.01	0.01	0.94
Residual	63	0.87		
Panel B: ANOVA (non-completion conditions only, $n = 62$)[a]				
Model	3	2.58	3.43	0.02
Feedback	1	0.08	0.11	0.74
Preferences	1	3.03	4.03	0.05
Preferences × feedback	1	4.39	5.84	0.02
Residual	58	0.75		

Refer to Table 1 for definitions of variables

[a]Dependent variable: square root transformation of participants' performance quantity

work on complete products (H2), but not when they work on non-complete products. Further, we examine the interaction effect between performance feedback and the state of completion. The results of the ANOVA reveal a significant interaction effect between performance feedback and completion ($F = 5.66$, $p = 0.02$, Table 2, Panel A). Hence, our results are consistent with H3, suggesting that performance feedback increases performance to a greater extent under completion than under non-completion. The equivalent nonparametric van der Waerden test including nonperformers shows that statistical inferences are unchanged when repeating the analysis incorporating nonperformers ($F = 4.75$, $p = 0.03$, Table 2, Panel C). Accordingly, a significant interaction is supported.

Notably, our findings are robust to controlling for participants' preferences.[16] However, as indicated by the descriptive results, individuals' preferences could affect performance. In particular, referring to Table 1 in the non-completion/performance feedback condition, participants perform significantly better when they have strong preferences compared with weak preferences (14.80 vs. 7.94). Therefore, we test for possible interaction effects of preferences. Specifically, we separate our analysis of possible interaction effects into two ANOVAs by differentiating between completion and non-completion conditions. For completion, we do not expect a significant interaction between participants' preferences and performance feedback, since we assume that individuals are generally likely to appreciate the feedback on completion because of its link to feelings of competence as stated in H2. Thus, feedback provides the same meaningful performance information, irrespective of participants'

[16] Other control variables (i.e., the participants' age, task experience, and major) were also included in the analysis and found not to be associated significantly with performance, while all the results remain inferentially identical.

preferences. The analysis for the completion condition (Table 3, Panel A) supports this assumption. The interaction between preferences and feedback is not significant ($F=0.01$, $p=0.94$), while the main effect of feedback on performance quantity remains significant ($F=10.09$, $p<0.01$).

By contrast, we find a significant interaction effect between preferences and feedback for the non-completion condition, as presented in Table 3, Panel B ($F=5.84$, $p=0.02$). This result sheds further light on the question whether performance feedback affects performance under non-completion by implying that performance feedback motivates individuals to increase their performance significantly more when participants' preferences are stronger than when participants' preferences are weak. We interpret this finding as being consistent with our reasoning that feedback motivates performance only when it is regarded as meaningful. In this sense, individuals who have a strong affinity for the activity will appreciate working on non-complete origami models and receiving feedback on their performance. By contrast, the findings imply that participants with weak preferences perceive the feedback as rather demotivating, which results in lower performance. In this regard, under non-completion, preferences prove to be an important factor that (also) determines whether the feedback has a motivating or demotivating effect driven by increased salience.

4.4 Additional analysis

4.4.1 Theory validation

To test whether the reasoning underlying our hypotheses explains participants' performance decisions, we conduct additional analyses of our post-experimental data. The questionnaire items were rated on a seven-point Likert scale ranging from one (strongly disagree) to seven (strongly agree), unless indicated otherwise.

With regard to H1, we analyze whether completion leads to overvaluation and whether this overvaluation increases individuals' tendency to select lower effort levels. In the development of H1, we expect completion to be associated with positive affect, emotional attachment, and feelings of competence. To examine whether completion fosters positive affective states with the product, we asked the participants to indicate whether they liked the product by using items adapted from Norton et al. (2012).[17] Factor analysis reveals one factor with an eigenvalue of 2.58 that explains 86.11% of the variance in the measures. The participants' responses indicate significantly greater liking for complete than non-complete products ($t=2.51$, $p=0.01$, two-tailed), suggesting that the participants value the outcome more when they were allowed to complete it. Similarly, we analyze whether individuals who successfully completed a product experienced happiness based on the statement "I was happy after I crafted the paper products." We find that participants in the completion conditions agree significantly more with this statement than participants in

[17] The exact items are as follows: "I enjoy the paper products I have made," "I like the paper products I have made," and "How do you like your paper products?" The last item was measured on a 10-point Likert scale ranging from 1 (not at all) to 10 (very much).

the non-completion conditions ($t=2.38$, $p=0.02$, two-tailed). These results are consistent with the consideration that completion increases positive affect (e.g., liking and happiness). Further, we use two items adapted from Schifferstein and Zwartkruis-Pelgrim (2008) to measure participants' emotional attachment to their product.[18] The factor analysis reveals one factor with an eigenvalue of 1.64 that explains 81.93% of the variance. As expected, the participants report significantly greater emotional attachment in the completion conditions ($t=4.06$, $p<0.01$, two-tailed). Additionally, we expect the completion of a product to result in stronger feelings of competence. Four items are adapted from Franke et al. (2010) and Mochon et al. (2012) to measure participants' feelings of competence.[19] The resulting factor has an eigenvalue of 2.86 and explains 71.58% of variance in the measure. The results indicate that participants who completed their product exhibit stronger feelings of competence ($t=2.95$, $p<0.01$, two-tailed). Overall, the analyses provide evidence that completion increases positive affect, emotional attachment, and feelings of competence, which is consistent with the theory we used in developing H1.

Given the overvaluation, we further argue that individuals in the completion condition are more easily satisfied with their own performance. In other words, they are satisfied with lower performance quantities compared with participants in the non-completion condition. To assess this prediction, we asked the participants to indicate the extent to which they felt productive, considering their actual performance. All the mean values are significantly higher than the scale midpoint (all $t>2.10$, all $p<0.05$, two-tailed), which suggests that irrespective of the condition, the participants performed the task at least to a point where they experienced a sufficient degree of productivity. Notably, the answers do not vary significantly across conditions ($\chi^2=0.28$, $p=0.96$), indicating that the participants were equally satisfied with their productivity even though the actual performance quantity varies considerably across conditions. The correlation analysis further reveals no significant correlation between perceived productivity and performance in the completion condition ($\rho=0.18$, $p=0.34$), but a significantly positive correlation in the non-completion condition ($\rho=0.33$, $p=0.08$). This analysis provides support for our theory, which asserts that individuals in the completion condition gain satisfaction from completion regardless of the number of products, whereas participants in the non-completion condition only feel productive as output increases. This further provides evidence that the state of completion can change the desired state. More precisely, we expect individuals in the non-completion/no performance feedback condition to strive for higher quantities compared with those under completion conditions. To examine this conjecture, we asked the participants to rate the extent to which they

[18] Emotional attachment reflects the closeness of the perceived relationship to the product. The items used are as follows: "The paper products are very dear to me" and "The paper products have no special meaning for me" (reverse coded).

[19] Feelings of competence reflect the extent of feeling proficient in performing the task at hand. The items used are as follows: "I am proud of my paper products," "I would like to show the paper products to other people," "When I look at the paper products I have made, I feel proud of having accomplished something," and "When I look at the paper products I have made, I feel proud of having achieved something".

agree with the statement "It was important to me to make as many paper products as possible." In line with our theory, the results show that when performance feedback is absent, participants under the non-completion condition are more inclined to set higher quantity-related goals than those under the completion condition ($t=2.03$, $p=0.05$, two-tailed).

In developing H2 and H3, which consider the impact of performance feedback, we rely on the directing and motivating function of feedback. In line with the goal-setting theory, we find that performance feedback prompts participants to set specific goals. Specifically, the participants with performance feedback agree significantly more with the statement "I set myself a goal of how many paper products I wanted to make" ($t=2.19$, $p=0.03$, two-tailed). Further, when performance feedback was provided, both groups rate quantity-related goals as equally important ($t=0.43$, $p=0.67$, two-tailed), which is consistent with our prediction based on the directing function of performance feedback. However, we assume that performance feedback has a differential effect on individuals' motivation to exert effort. More precisely, we expect the motivating effect of performance feedback to be significantly greater in the completion condition than in the non-completion condition. To analyze this notion, participants had to assess whether they were motivated by watching their performance. In line with our assumption, the results show that individuals in the completion condition agree significantly more with this statement when provided with performance feedback ($t=2.11$, $p=0.04$, two-tailed). By contrast, for non-completion, performance feedback does not affect the participants' response behavior ($t=0.85$, $p=0.40$, two-tailed), which suggests that feedback does not lead to an increase in motivation.[20] In accordance with this notion, the participants in the completion/performance feedback condition agree more with the statement that they steadily wanted to improve their performance, compared with participants without feedback ($t=2.72$, $p<0.01$). By contrast, we find no significant difference between the presence and absence of performance feedback in the case of non-completion ($t=1.57$, $p=0.12$). Notably, the mean values (non-completion/no performance feedback = 5.62 vs. non-completion/performance feedback = 4.81) indicate that performance feedback in the non-completion condition could have a negative effect on individuals' motivation. In summary, we conclude that performance feedback regulates goal setting and motivates individuals in the completion condition to compete with themselves, whereas we do not find a significant motivation effect in the non-completion condition.

4.4.2 Alternative explanations and the robustness of findings

In this section, the first set of tests addresses potential alternative explanations for our findings, while the second set adds to the robustness of our findings. First, since participants in the completion condition without performance feedback completed a relatively small number of products and increased their quantity in the performance

[20] We find marginal evidence showing that participants with weak preferences are less motivated by performance feedback than those with strong preferences ($t=1.70$, $p=0.10$, two-tailed).

Table 4 Analysis of high and low performers

Source of variation	*df*	Mean square	*F* statistic	*p* value
Panel A: ANOVA (low performers only, $n=70$)[a]				
Model	3	2.61	8.41	<0.01
Feedback	1	2.40	7.73	<0.01
Completion	1	0.43	1.38	0.24
Completion × feedback	1	5.23	16.83	<0.01
Residual	66	0.31		
Panel B: ANOVA (high performers *only*, $n=59$)[a]				
Model	3	1.21	3.25	0.03
Feedback	1	1.55	4.16	0.05
Completion	1	0.20	0.53	0.47
Completion × feedback	1	1.58	4.22	0.04
Residual	55	0.37		

Refer to Table 1 for definitions of variables

[a]Dependent variable: square root transformation of participants' performance quantity

feedback condition, one could argue that they sacrificed quantity for quality or vice versa. Prior research demonstrates that the assignment of a quantity-related goal (quality-related goal) results in reduced quality-related (quantity-related) performance (Bavelas and Lee 1978; Shalley 1991, 1995). In a similar vein, quality-related incentives and informal controls are found to direct individuals on quality-related dimensions, resulting in lower quantity (Kachelmeier et al. 2008, 2016). To test whether individuals reduce quantity for the sake of quality, we asked participants to assess how much emphasis they put on the quality or the quantity. In general, the participants do not differ in the importance they attribute to product quality across conditions ($\chi^2=3.75$, $p=0.29$). Additionally, in none of the conditions does the stated importance of quality differ significantly from the stated importance of quantity (all $t<1.63$, all $p>0.11$). Overall, the responses do not indicate a quality–quantity shift.

Second, we consider gender a covariate in our analysis, since gender may influence the participants' performance differently (Roberts 1991; Shalley 1995). Further, Geddes and Konrad (2003) suggest that men and women respond differently to performance feedback. An analysis of covariance (ANCOVA) indicate that gender is indeed able to significantly predict performance ($F=6.87$, $p=0.01$; untabulated). However, the significance levels of our hypothesized associations remain stable, indicating that our results are not contingent on differences in gender across conditions.[21]

[21] Since gender has a significant effect on performance, we test for possible interaction effects of gender and our independent variables by including gender as a third factor in the ANOVA (untabulated). Our inferences remain unchanged. Further, neither the effect of completion ($F=0.87$, $p=0.35$) nor the effect of performance feedback on performance ($F=0.13$, $p=0.72$) differs in gender, as evidenced by the nonsignificant interactions between these variables. Additionally, the three-way interaction is also nonsignificant ($F=0.21$, $p=0.64$). Therefore, we surmise that the interaction between completion and performance feedback is unlikely to differ by gender. Altogether, we conclude that, although gender does impact performance, it does not distort the effects of our independent variables on performance.

Third, the participants could have been prone to reciprocity because they could have been thankful for being paid for an (interesting) task. Therefore, we control for reciprocity by asking whether and to what extent they agree with the statement "I folded because I felt treated fairly." The participants' responses do not vary significantly between groups ($\chi^2 = 0.16$, $p = 0.98$). The addition of reciprocity as a covariate to the ANOVA does not change our inferences, with reciprocity itself not being significant ($F = 0.40$, $p = 0.88$; untabulated).

Finally, the last set of tests adds to the robustness of our findings. Specifically, we examine the behaviors of high and low performers. For this purpose, we split our sample into two groups and classify participants whose performance is above (below) the median as high (low) performers. Repeating the ANOVAs, one each for the high and low performers, shows the findings are robust in both models, as shown in Table 4, Panel A and Panel B. In particular, both groups maintain a significant main effect for feedback (low performers, $F = 7.73$, $p < 0.01$; high performers, $F = 4.16$, $p = 0.05$) and a significant interaction effect (low performers, $F = 16.83$, $p < 0.01$; high performers, $F = 4.22$, $p = 0.04$). Thus, the inferences are supported, irrespective of the participants' performance level.

5 Conclusion

This study reports the results of a laboratory experiment that examines whether tasks that involve either completion or non-completion of a product/process moderate the effect of performance feedback on individuals' performance. In the absence of performance feedback, we find that the overvaluation induced by completion reduces performance, resulting from complacency after successful completion. Moreover, our results suggest that the presence of performance feedback represents an efficient mechanism to increase performance and overcome complacency under completion. By contrast, the positive effect of performance feedback vanishes when individuals work on tasks that feature non-completion. Supplemental analyses reveal that task preferences do not evoke different behavioral effects in the case of completion but play a critical role in determining behavior in response to performance feedback under non-completion. In this respect, strong task preferences appear to add meaning to the performance feedback, regardless of the task's seemingly low intrinsic attractiveness (i.e., non-completion), whereas weak task preferences could render the performance feedback less relevant and thus may cause negative performance effects.

Our study is, to our knowledge, the first to test the interactive relation of performance feedback and the state of completion as a task characteristic. By identifying the state of completion as an important determinant of the effectiveness of feedback, our results contribute to the stream of research that examines the effects of feedback (Buchheit et al. 2012; Kluger and DeNisi 1996). Extant management accounting research on feedback and task-characteristics has focused on task complexity (Brown et al. 2016; Buchheit et al. 2012) or on multi-task environments (Hannan et al. 2013, 2019). In this vein, our findings have practical implications for management accountants who design control systems. Firms should be aware that the state

of completion is an important contextual factor that contributes substantially to the effectiveness of performance feedback. When tasks feature completion, firms could therefore consider the use of performance feedback to reduce complacency effects and increase performance. By contrast, as long as the task features non-completion, firms could refrain from implementing (sophisticated) feedback mechanisms due to lack of benefit. Moreover, by transferring the findings from the basic IKEA effect to a repetitive setting, our study highlights the critical role that task design can play in understanding performance variation by revealing unintended consequences that could be sensitive to completion.

As with all research, the study has limitations that provide avenues for future research. First, by using a well-structured multi-step task, our experimental scenario is less complex than many real-world settings, which enables us to clearly differentiate between completion and non-completion. We consider our results to be most directly applicable to employees without managerial decision rights, since they tend to perform structured and routine tasks that often have a predefined end. In the near future, the use of technological advancements, such as robotic process automation, will increasingly automate well-structured routine tasks, which may limit the relevance of our results. Future research may therefore wish to investigate whether our findings transfer to more complex task settings in which the state of completion cannot be precisely determined. Moreover, future research could investigate whether our findings apply to long-term tasks. Second, our experiment covers a simple task that allows participants to easily keep track of their recent achievements, even without explicitly providing performance feedback. Thus, the participants without performance feedback were able to count their rather small quantities of products. Therefore, performance feedback could have greater impact in settings where task achievements are more complex, multifaceted, or hardly observable. Although our experimental design likely weakens the effect, the effectiveness of performance feedback is expected to increase in practice, where performance is, per se, more difficult to observe. Third, in our study, we capture only one type of potential performance information, namely, outcome-based quantitative feedback. Thus, future research is needed to explore how other feedback types, such as subjective, quality-related, and other types of non-financial and financial feedback, could affect performance in non-completion/completion settings.

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