

Systematic Reflection: Implications for Learning from Failures and Successes

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**Abstract**

Drawing on a growing stream of empirical findings that runs across different psychological domains, we demonstrate that systematic reflection stands out as a prominent tool for learning from experience. For decades, failed experiences have been considered the most powerful learning sources. Despite the theoretical and practical relevance, scant research has investigated whether people can also learn from their successes. We show that through systematic reflection people can learn from both their successes and failures. Studies have further shown that the effectiveness of systematic reflection depends on situational (e.g., reflection focus) and person-based factors (e.g., conscientiousness). Given today's unrelenting pace and the abundance of activities in which people are involved, future research may want to investigate how to effectively integrate systematic reflection within the busy daily environment of the learner.

**KEYWORDS:** reflection – learning – successes – failures – performance

**Systematic Reflection: Implications for Learning from Failures and Successes**

"We learn from failure, not from success!" In Bram Stoker's classic novel '*Dracula*' (1897), these were the words of Professor Van Helsing to Dr. Seward. It is not only conventional wisdom that we learn most from failures and mistakes. For decades, psychologists have considered failures as the most powerful learning sources. According to Thorndike's law of effect, negative outcomes that accompany failure serve as punishment, increasing the probability of adapted behavior in subsequent events. Furthermore, traditional attribution theories have posited that people who are capable of attributing failure to personal and controllable factors (e.g., limited effort) learn the most (Weiner, 2000).

It is remarkable that scant research attention has been paid to the question whether people can also learn from their successes. Learning from successes is not only vital from a theoretical point of view, it also has substantial practical relevance. For instance, in high-risk environments (e.g., nuclear power, hospital or aviation industry), failure can mean maiming, disability, and huge environmental, financial, societal, and psychological costs. Hence, it is key that people are also able to learn from their successes before disasters take place. Despite the motivational benefits successes may have (e.g., increased belief in one's competence; Hall, 1971), they also confirm prior expectancies and boost confidence in old routines, causing restricted search and reduced attention, while increasing complacency and risk aversion (Sitkin, 1992; Zakay, Ellis, & Shevsky, 2004).

The objective of our review is to highlight systematic reflection as an effective tool for learning from both failed and successful experiences. In the following section, we introduce systematic reflection as a learning procedure, after which we draw on a growing stream of findings that runs across different psychological domains to empirically substantiate its effectiveness. Subsequently, we review research that has sought to determine situational and

person-based moderators that shape the effectiveness of systematic reflection. We end by discussing future research prospects.

### **Systematic Reflection: Concept and Process**

Systematic reflection is a learning procedure during which learners comprehensively analyze their behavior and evaluate the contribution of its components to performance outcomes. To facilitate this comprehensive processing of experiential data, Ellis and Davidi (2005) emphasized that systematic reflection serves three functions: self-explanation, data verification, and feedback. Systematic reflection requires individuals or teams to engage in each one of these activities.

*Self-explanation* is an active process whereby learners are asked to analyze their own behavior and advance explanations for the resulting success or failure. A high number of self-explanations indicates active processes of gathering, analyzing, and integrating data (Ellis & Davidi, 2005). Questions that might prompt self-explanation are "how did you contribute to the performance observed in the experience" and "how effective were you in this experience" (DeRue et al., 2012), but also more direct questions such as "why did you do A or decide B?". The relative advantage of these direct questions is that they encourage learners to provide specific and internal explanations. The more learners attribute performance to specific and internal factors, the more effective is the reflection process (Ellis, Mendel, & Nir, 2006). In lay terms, accurate analysis of the experience is an important factor in the learning process, but this is not the only one. By attributing the causes for successes and failures to oneself, people take more responsibility for their behavior.

*Data verification* is the process whereby learners are confronted with a different perception of the same data (i.e., counterfactual thinking), enabling them to cross-validate information they hold before making changes to their mental models. Data verification also enables to sidestep potential biases, including confirmation bias, whereby information that

contradicts assumptions is overlooked, and hindsight bias, whereby outcomes strongly affect how past experience is viewed. Possible prompts include "consider a different approach that could have been taken" and "what might have happened if that approach was chosen" (DeRue et al., 2012). Similarly, comparing and contrasting personal actions with similar actions played out in other (more or less successful) situations may be an effective way for developing a different perspective on the value of one's actions (Roberto, 2009).

Finally, two kinds of *feedback* are generated during a systematic reflection process. The first type is the performance evaluation: absolute/relative success or failure. Such outcome feedback does not only serve as a motivational trigger for the reflection process; without outcome feedback, reflection is not focused and goal directed and therefore not effective (Anseel, Lievens, & Schollaert, 2009). Second, process feedback is generated which is aimed at improving the process of task performance. When systematically reflecting, the learner is responsible for the analysis of his/her performance data and for generating reasons why things went right or wrong. Possible prompts are "what worked, what did not work", "what has been learned from the experience", and "how will you behave in the future?" (DeRue et al., 2012). Taken together, systematic reflection is not the same as outcome feedback moments. Whereas outcome feedback is merely evaluative in nature, the process that follows this feedback in a reflection procedure focuses on helping the learner to systematically analyze the decisions that produced the performance outcomes.

### **Effectiveness of Systematic Reflection**

Generally, the combination of the three functions that characterize systematic reflection (self-explanation, data verification, and feedback) lead to a greater willingness (motivational effect) and ability to draw lessons from prior experiences (cognitive effect) and eventually to a behavioral change (behavioral effect).

### **Motivational Outcomes of Systematic Reflection**

Successful experience is not a "natural" stimulus of learning. Although successes may improve learners' judgment of how well they can execute similar courses of action for dealing with prospective situations (i.e., self-efficacy), they also reduce one's inclination to revise existing knowledge structures. The motivational impact of systematic reflection on these successes is twofold. First, research in military psychology found that systematic reflection is most effective to attract soldiers' attention not only to the obvious failed experiences encountered during navigation exercises but also to successful experiences. Through becoming aware of the role these less apparent successful experiences have had on one's performance, learners' motivation to revise their knowledge structures (i.e., epistemic motivation) may be intensified (Ellis & Davidi, 2005). Similarly, in experimental social psychological research, it has been shown that the prompt to not only consider better, but also worse alternatives for what actually happened (leading to a focus on successful experiences) can have a beneficial impact on an individual's motivation to thoroughly process a subsequent task (Dyczewski & Markman, 2012). Second, through analyzing their successful experiences, learners become more aware of their share in the successes, further increasing their self-efficacy and motivation to set higher goals (Anton & Villado, 2013; Ellis, Ganzach, Castle, & Sekely, 2010).

### **Cognitive Outcomes of Systematic Reflection**

Increased epistemic motivation caused by reflecting on both failed and successful experiences has been found to produce richer cognitive structures (Ellis & Davidi, 2005; Matthew & Sternberg, 2009). Research in sport and organizational psychology has shown that systematic reflection changes the relative number of internal versus external and specific versus general perceived causes of behavior (Allen, Jones, & Sheffield, 2010; Ellis et al., 2006). Similar findings were found in aviation psychology, where post-flight reviews following a successful flight or a close call yield specific lessons for navigating future flights

(Morris & Moore, 2000; Ron, Lipshitz, & Popper, 2006). On a team level, reflection enhances similarity of team members' task representations (van Ginkel & van Knippenberg, 2009). The realization that task representations are shared has been shown to increase psychological safety, which enhances group processes (Edmondson, 1999).

### **Behavioral Outcomes of Systematic Reflection**

In organizational, social, and medical psychology, reflecting on successful and failed experiences has been found to improve task performance (e.g., Anseel et al., 2009; Ellis & Davidi, 2005; Ellis et al., 2006; Kray, Galinsky, & Markman, 2009; Vashdi, Bamberger, Erez, & Weiss-Meilik, 2007; Wong, Haselhuhn, & Kray, 2012), and to cause changes in interpersonal behavior (e.g., DeRue et al., 2012; Grant & Dutton, 2012; Van Ginkel & Van Knippenberg, 2009; Villado & Arthur, 2013).

Ron et al. (2006) demonstrated that post-flight reviews were not only vehicles to improve individuals' learning, but also to improve air crews' performance via shared observations and interpretations of what went good and bad during the flights. This reflection procedure also shaped the training methods of the squadron, and even helped to develop the air force doctrine.

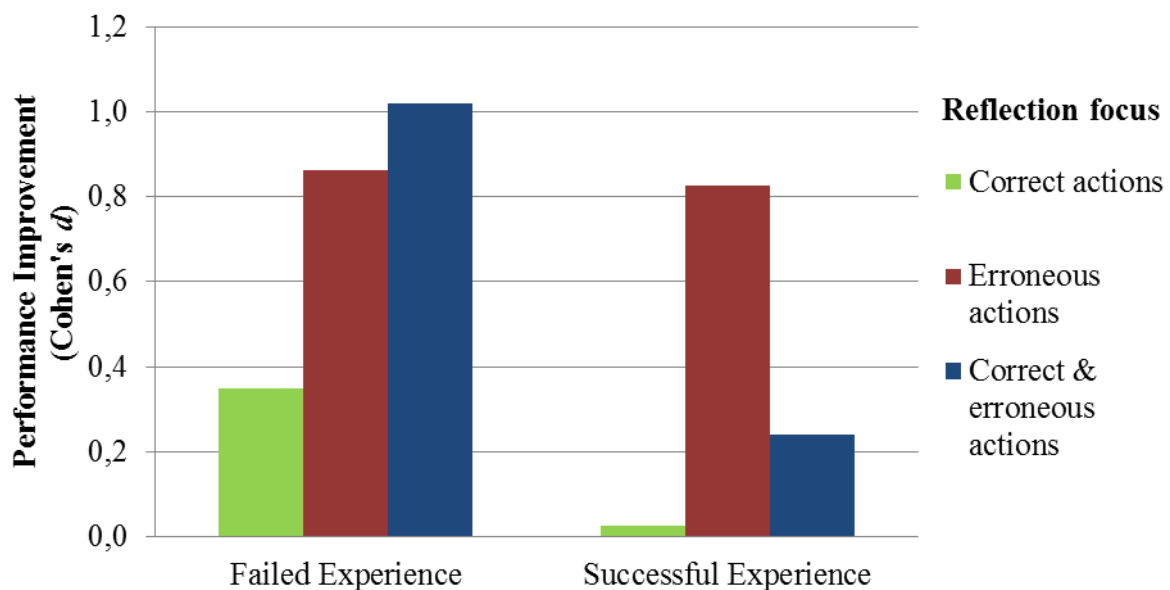
### **When and For Whom is Systematic Reflection Most Effective?**

An important stream of research has sought to determine under which conditions systematic reflection is most developmental. Learners can reflect on objective, video-based recordings or on subjective, memory-based recalls of their performance. Research has revealed that these ways of reflecting are equally effective (Villado & Arthur, 2013). Similarly, Ellis et al. (2010) showed that observing the filmed behavior of someone else who participated in a reflection procedure is equally effective as personally participating in a reflection procedure. These findings are especially relevant for contexts where different individuals need to learn similar tasks. For instance, members of a fire brigade can learn from



events that their colleagues have experienced, simply by watching their reflection processes. In this respect, filmed reviews may offer a cost-effective, technology-based, and easy-to-use tool to provide training.

Ellis et al. (2006) demonstrated that the effectiveness of reflecting on successful versus failed experiences may depend on the focus of reflection during the self-explanation stage. They examined the relative effectiveness of three different reflection foci after a failed or successful experience: a focus on (1) correct actions that supported progress in the experience, (2) erroneous actions that hindered progress, and (3) both correct and erroneous actions. Besides the fact that after a failed experience, providing any kind of reflection contributes to one's progress, the results also showed that one can learn from successful experiences and that the performance improvement after failed and successful experiences is contingent upon the particular focus of reflection (see Figure 1).



**Figure 1.** Comparison of the effectiveness of three different reflection foci after a failed versus successful experience. The effect size (Cohen's  $d$ ) represents the standardized performance difference between participation versus no participation in a reflection procedure. Effect sizes of  $d = 0.2$ ,  $0.5$ , and  $0.8$  are generally considered small, medium, and large, respectively (Cohen, 1988).

After a failed experience the biggest performance improvement takes place when focusing on both correct and erroneous actions. However, after a successful experience the

strongest learning effect emerges when reflecting on the erroneous actions only. It could be that after successful experiences, learners feel more psychologically safe to discuss their errors. Conversely, after failures, self-efficacy may be harmed and psychological safety may be lacking, requiring reflection on correct actions as well. Hence, through reflection we can learn from both successful and failed experiences, but the focus of reflection should be adapted to the outcome of the experience.

Apart from research on situation-based moderators, it is likely that people who go through the same reflection process draw different lessons. The reflection effect is accentuated when people are conscientious, open to experience, emotionally stable, and have a rich base of prior experiences (DeRue et al., 2012). Furthermore, systematic reflection is more effective for learning oriented people, and for people who enjoy effortful cognitive activity (Anseel et al., 2009). Likewise, people who can accurately evaluate their performance benefit more from systematic reflection (Ellis, Mendel & Aloni-Zohar, 2009; Ellis et al., 2010). This also means that systematic reflection is likely to be less beneficial for people with the reverse personal characteristics.

### **Future Research Prospects**

Although important progress has been made to uncover the role, effectiveness and boundary conditions of systematic reflection, there also exist key unresolved issues. We outlined three central functions in which learners should engage when reflecting (self-explanation, data verification, and feedback). To date, the outcomes of these functions have not been disentangled from each other. This makes it unclear whether all functions contribute to the same extent to the effectiveness of reflection. Also, their relative functionality may depend on the outcome of the experience that is reflected upon. For instance, Ellis and Davidi (2005) suggested that if learners want to analyze successful performance, they must focus on the potential misfits between the existing mental model and the conditions under which

performance was executed, highlighting the importance of *data verification* for learning from successes. Conversely, as people are naturally inclined to attribute successes to internal actions and failures to external factors (self-serving bias), *self-explanation* instructions may be more important when reflecting on failed experiences.

Another challenging issue is motivational in nature. Despite the promising effects of systematic reflection, for most individuals reflection is probably the least favorite activity (Ashford & DeRue, 2012). This may be caused by the unrelenting pace characterizing today's environment and the abundance of activities in which people are involved. As reflection is a time-intensive endeavor, being engaged in too many experiences simultaneously typically jeopardizes individuals' inclination to engage in thoughtful deliberation of these experiences, leading to lower levels of learning than desirable (Carette & Anseel, 2012). Hence, we need to look for ways that enhance individuals' motivation to engage in reflection despite their high mental workload.

An interesting pathway would be to complement traditional collective reflection that takes place when a long-term project is finished, with individual reflection that is integrated within the learner's daily environment (e.g., reflection via smartphone/tablet applications that successively prompt for self-explanation, data verification, and feedback). For instance, in the absence of collective "chalk talks" during the off-season, athletes could use such an app to individually reflect on their training performance. Similarly, organizations could send monthly invitations to their employees for reflecting online on personal actions of the past month that supported/hindered progress in their most time-intensive assignment. Findings from experimental simulation research have shown that such relatively brief structured individual reflection yields significant returns for one's development (Anseel et al., 2009). Furthermore, such implementations would make it possible to reflect solitarily and on the spot, diminishing the situational constraints that characterize collective reflection procedures.

All of this may facilitate a structural incorporation of reflection into the learner's environment – making reflection a routine rather than a momentary activity – which is a necessary precondition to maintain long-term effects (Garvin, 2000).

### **Conclusion**

In this article, we reviewed new studies that introduce systematic reflection as a meaningful way to draw lessons from our successful and failed experiences and improve our performance accordingly. Finding ways to learn from various forms of experience is important from both a theoretical and practical point of view. It also exemplifies that Professor Van Helsing was only partly right. We can learn from our failures, but we can also learn from our successes.

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