

2-2014

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DOI: <https://doi.org/10.1177/0963721413504106>

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Citation

ELLIS, Shmuel; CARETTE, Bernd; ANSEEL, Frederik; and LIEVENS, Filip. Systematic reflection: Implications for learning from failures and successes. (2014). *Current Directions in Psychological Science*. 23, (1), 67-72. Research Collection Lee Kong Chian School Of Business.

Available at: https://ink.library.smu.edu.sg/lkcsb_research/5673

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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 demonstrated 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, few researchers have investigated whether people can also learn from their successes. We showed that through systematic reflection, people can learn from both their successes and their failures. Studies have further shown that the effectiveness of systematic reflection depends on situational (e.g., reflection focus) and person-based (e.g., conscientiousness) factors. Given today's unrelenting pace and the abundance of activities in which people are involved, future researchers may want to investigate how to effectively integrate systematic reflection within the busy daily environment of the learner.

Keywords

reflection, learning, successes, failures, performance

"We learn from failure, not from success!" In Bram Stoker's (1897/2007, p. 190) classic novel *Dracula*, these words are spoken by Professor Van Helsing to Dr. Seward. Although it is conventional wisdom that we learn most from failures and mistakes, for decades psychologists too have considered failures the most powerful learning sources. According to Thorndike's law of effect, negative outcomes that accompany failure serve as punishment, which increases 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 of whether people want and are able to learn from their successes. Learning from successes not only is vital from a theoretical point of view but also has substantial practical relevance. For instance, in high-risk environments (e.g., hospitals, the nuclear power or aviation industries), failure can mean maiming, disability, and huge environmental, financial, societal, and psychological costs. Thus, 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, which causes restricted search and reduced attention, while increasing complacency and risk aversion (Sitkin, 1992; Zakay, Ellis, & Shevsky, 2004).

Our objective in this review was 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. Ellis and Davidi (2005) emphasized that to facilitate this comprehensive processing of experiential data, systematic reflection serves three functions: self-explanation, data verification, and feedback. Systematic reflection requires individuals or teams to engage in each 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 include, "How did you contribute to the performance observed in the experience?" and "How effective were you in this experience?" (DeRue, Nahrgang, Hollenbeck, & Workman, 2012, p. 1003), but questions that are more direct also might prompt self-explanation, such as "Why did you do A or decide B?" The relative advantage of 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 factor. By attributing the causes for successes and failures to themselves, 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), which enables them to cross-validate information they hold before making changes to their mental models. Data verification also enables learners to sidestep potential biases, including confirmation bias, in which information that contradicts assumptions is overlooked, and hindsight bias, in which outcomes strongly affect how 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, p. 1003). In addition, comparing and contrasting personal actions with similar actions played out in other (more or less successful) situations may be an effective way to develop a different perspective on the value of one's actions (Roberto, 2009).

Finally, two kinds of *feedback* are generated during systematic reflection. The first type is the performance evaluation: absolute/relative success or failure. Such outcome feedback serves as a motivational trigger for the

reflection process, and without outcome feedback, reflection is not focused and goal directed and, therefore, not effective (Anseel, Lievens, & Schollaert, 2009). The second type of feedback aims to improve the process of task performance. When systematically reflecting, the learner is responsible for the analysis of his or her performance data and for generating reasons why things went right or wrong. Possible prompts include, "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, p. 1003). Systematic reflection is not the same as outcome-feedback moments: Outcome feedback is merely evaluative in nature, whereas 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) leads to a greater willingness (motivational effect) and ability (cognitive effect) to draw lessons from prior experiences 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 has shown that systematic reflection is most effective to attract soldiers' attention to not only the obvious failed experiences encountered during navigation exercises but also the successful experiences (Ellis & Davidi, 2005). By becoming aware of the role these less apparent successful experiences have had in one's performance, learners' motivation to revise their knowledge structures (i.e., epistemic motivation) may be intensified (Ellis & Davidi, 2005). Similarly, experimental social psychological research has shown that the prompt to consider both better and 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, by analyzing their successful experiences, learners become more aware of their share in the successes, which further increases their self-efficacy

and motivation to set higher goals (Ellis, Ganzach, Castle, & Sekely, 2010; Villado & Arthur, 2013).

Cognitive outcomes of systematic reflection

Increased epistemic motivation caused by reflecting on both failed and successful experiences has been shown to produce richer cognitive structures (Ellis & Davidi, 2005; Matthew & Sternberg, 2009). Research in sport and organizational psychology has suggested 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). Similarly, studies in aviation psychology have shown that postflight reviews after 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 shown 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 postflight reviews were vehicles to improve not only individuals' learning but also aircrews' 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?

In an important group of studies, researchers have 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 has participated in a reflection procedure is equally as effective as personally participating in a reflection procedure. These findings are especially relevant for contexts in which 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 colleagues' 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 reflection foci after a failed or successful experience: a focus on (a) correct actions that supported progress in the experience, (b) erroneous actions that hindered progress, and (c) 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 obtained by Ellis et al. showed that one can learn from successful experiences and that the performance improvement after failed and successful experiences is contingent on the particular focus of reflection (see Fig. 1).

After a failed experience, the biggest performance improvement takes place when individuals focus on both correct and erroneous actions. However, after a successful experience, the strongest learning effect emerges when individuals reflect 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, thereby requiring reflection on correct actions as well. Thus, through reflection, individuals 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 et al., 2010; Ellis, Mendel, & Aloni-Zohar, 2009). These differences also mean that systematic reflection is likely to be less beneficial for people with the reverse personal characteristics.

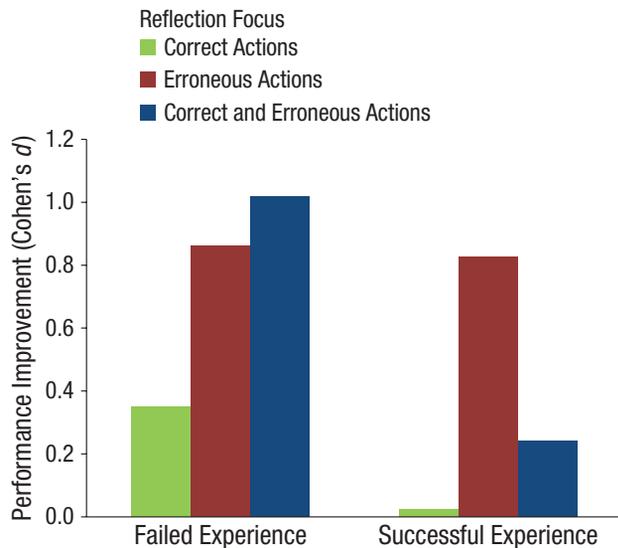


Fig. 1. Performance improvement as a function of experience (failed vs. successful) and reflection focus. The effect size (Cohen's *d*) represents the standardized performance difference between participation versus no participation in a reflection procedure. Effect sizes of 0.2, 0.5, and 0.8 are generally considered small, medium, and large, respectively (Cohen, 1988). Data from Ellis, Mendel, and Nir (2006).

Future Research Prospects

Although important progress has been made to uncover the role, effectiveness, and boundary conditions of systematic reflection, key unresolved issues also exist. 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. Thus, it remains 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 on. 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, thereby highlighting the importance of data verification for learning from successes. Conversely, given that 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 individuals reflect 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 aversion may be caused by the unrelenting pace characterizing

today's environment and the abundance of activities in which people are involved. Given that 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, which leads to lower levels of learning than desirable (Carette & Anseel, 2012). Thus, researchers 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 application 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, thereby diminishing the situational constraints that characterize collective reflection procedures. All of this may facilitate a structural incorporation of reflection into the learner's environment—by making reflection a routine rather than a momentary activity—which is a necessary precondition to maintaining long-term effects (Garvin, 2000).

Conclusion

The studies reviewed in the research presented here 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 a 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.

Recommended Reading

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Author Contributions

S. Ellis and B. Carette contributed equally to this manuscript. S. Ellis developed the study concept. B. Carette drafted the manuscript under the supervision of F. Anseel and F. Lievens. S. Ellis, F. Anseel, and F. Lievens critically revised the manuscript. All authors approved the final version of the manuscript for submission.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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