CHAPTER 3

Installing an Action Space for Resilience in Surprising Situations

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INTRODUCTION

As soon as this so-called layer touched me, I was overthrown, because it was much bigger than I thought it was.

I didn't even think what to do, I just worked, like a robot. And whatever I did, I did automatically.

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These quotes from a ski-hiker describing how he got hit by an avalanche exemplify the context focused upon in this chapter. Such a situation of surprise leaves no room for beforehand planning or preparation, evaluation and reflection of the event. To survive, the ski-hiker must be trained in certain rules, but he has to simultaneously expand his option space where rules are misleading.

In the current volatile, uncertain, complex, ambiguous environments (D'Aveni, 1995; Fiksel, 2015), under strong competitive pressures (Asano, 2012), organizations are required to cope with crises (Kahn et al., 2013), economic distress (Klehe et al., 2012) and surprises (Buchanan & Denyer, 2013; Sutcliffe & Vogus, 2008). The resulting interest in the value of resilience (Moenkemeyer et al., 2012; Välikangas & Romme, 2013), led to calls for additional research into the antecedents of successfully managing surprise (e.g., Meneghel et al., 2016). On the organizational level this also provides the motivation to explore the relationships and trade-offs between exploitation of existing knowledge and organizational codes and the exploration into new domains of knowledge through organizational learning (March, 1991).

In this chapter we focus on the role of rules in exploitation processes in surprising situations, and in processes of exploration in the sense of expanding the actor's option space where directly applicable rules are lacking or where the rigid following of rules may be detrimental. The goal of this chapter is to answer the following research question: *What is the relationship between types of skill development and resilient action in surprising situations?* For this, we explore the link between types of training and background knowledge and resilient action. We begin with an overview of current research on resilience, adopt a definition of resilience and resilient action. A summary of literature about rules and routines follows and we link these concepts by focusing on a specific mode of skill development, called drill. In the Empirical Study section, we describe the research setting and methods we used to collect and analyse data. Results of the analysis, summarized in the Findings section, are then used to create a model of relationships between modes of skill development and resilient action in situation and surprise. Finally, we discuss the implications of this research.

THEORETICAL BACKGROUND

A diverse set of research deals with both the necessity and the rigidity of rules or routines of individual actors and organizations. This has been examined already from various perspectives, such as organizational learning (March, 1991), organizational routines (Feldman, 2000, 2003; Feldman & Pentland, 2003), and by studying the interplay between rule-following and rule-breaking (Ortmann, 2010). Literature on sense-making, such as by Weick (1995), provides further options for exploring the conditions and antecedents for dealing with unexpected situations, particularly by emphasizing the influence of the actor's identity. Somewhat contrasting the primary focus on the organizational level of these contributions, we focus on the individual and view the organization as the context for resilient action.

Resilience and Resilient Action

Resilience has been the subject of research for decades, with a large number of definitions being formulated in various research fields and from different perspectives (Linnenluecke, 2017), sparking the formation of multiple branches of resilience research. One of these branches describes resilience as the ability of a system to bounce back to its original state after encountering adversity (Sawalha, 2015), with some authors asserting that more resilient systems do not only return to their previous state, but come out of the adverse event more prosperous than before (Carvalho et al., 2012). Another branch views resilience as the ability of a system to remain within a certain threshold when faced with adversity. Gaillard (2007) claims that a system is resilient as long as it maintains its original function or identity despite adversity. This may be achieved through adjustments within the system which enable the system to adapt (McCarthy et al., 2017; Ortiz-de-Mandojana & Bansal, 2016). In this chapter, we adopt the view of *resilience* as the ability of a system or an individual to remain within a certain threshold following adverse events, this threshold being represented by the system's or individual's ability to continue operations and maintain its identity.

Means of achieving resilience are also being debated. One line of research suggests that resilience is a result of the implementation of certain structures, strategies (Somers, 2009) and culture (Daskon, 2010) within an organization. Others suggest that resilience results from

behaviours at the individual level, which enhance the ability of the entire system to withstand adversity (Lengnick-Hall et al., 2011). We propose to reconcile these two views by adding to the above definition resilience to be potentially supported by specific organizational conditions. This definition of *resilient action* thus corresponds to the use of the term in, for example, Smith et al. (2014), who suggest that specific resilient practices maintain resilience, or Smith et al. (2013), who reserve the term resilient action for actions which address a specific safety barrier.

Antecedents of Resilient Action

The Role of Rules

Knowledge is the ability to draw distinctions between concepts within a certain domain of action based on context and theory (Tsoukas, 2005). According to Gatarik and Born (2012), knowledge is composed of four components: expert knowledge (including experience and expertise), procedural knowledge (including rules and routines), folk- and cultural knowledge and explanatory meta-knowledge. First, we focus on rules, which can be defined as repetitive, unchanging patterns of behaviour. Tsoukas (2005, p. 74) refers to rules as ‘generalizations connecting types of behaviour by types of actors to types of outcomes’. In this sense, Tsoukas emphasized the role of a decision-maker’s ability to distinguish such situations that fit the type of behaviour mandated by a rule. Based on this distinction, an individual would then decide whether to follow a rule.

Rules provide a means to coordinate and control processes, streamline decision-making by providing a pre-determined response and protect an organization from uncertainty by fixing certain parameters and providing the possibility of predictable behaviour in uncertain situations (Becker, 2004). Additionally, rules may act as shock absorbers at the organizational level by gradually aligning certain aspects of each rule to current demands of an organization’s environment (Berente et al., 2016). Moreover, rules can be a resource when attempting to balance and manage conflicting goals in an organization, even allowing an organization to accomplish multiple conflicting goals at the same time by facilitating new connections between members of an organization (Salvato & Rerup, 2018). Certain routines can also lead to new outcomes and novel solutions in organizations (Deken et al., 2016).

Rules can be broken, which traditionally is negatively framed in the organizational literature as a form of deviance (Martin et al., 2013; Tyler & Blader, 2005). Ortmann (2010), however, claims that the possibility of rule-breaking is necessary for the effective functioning of organizations. This is due to what he refers to as *drift*, incremental changes in rules which result in rules no longer fulfilling their purpose. Thus, following rules without reflection may have disastrous results. Ortmann (2010) provides examples of such cases, such as friendly fire occurring in Iraq, with more in literature (e.g., Oliver et al., 2017, 2019; Schakel et al., 2016).

The idea that rules can change over time is supported by Feldman (2000), who argues that the changes result from agents following rules while reflecting on the outcomes. If following a rule has unintended outcomes or does not show the intended outcomes, or if agents perceive a potential of the rule to lead to greater outcomes, they change the rule. These changes occur gradually over repeated instances of rule-following, possibly benign and unnoticed (Feldman, 2003). However, as Ortmann's (2010) concept of drift emphasizes, these small changes may accumulate to the point of no return. A similar effect has been shown on the organizational level for the trade-off between exploration and exploitation already in March's (1991) seminal work. The short-term benefits of rule following, in March's terms following the organizational code, are offset by a lack of code development which is only possible through deviation from rules.

Koenig et al. (2016) distinguish two types of rules: complex rules which cannot be expected to be followed strictly and absolutely, as they are too specific to fit a large number of situations; and basic rules, which can be expected to be followed strictly by every competent actor, because they are broad enough that they will fit essentially any situation in such a way that strictly following the rule will lead to the fulfillment of its original purpose. To illustrate this distinction Koenig et al. (2016, p. 5 citing Reynaud, 1993, pp. 35-36) use the complex rule of speed limits and the simple rule of stop signs in traffic. The rule of speed limits in traffic cannot be expected to always be strictly followed, as such strict adherence would defeat the original purpose of the rule: to increase road safety. For example, when overtaking, adhering to the speed limit would make the manoeuvre take longer, thus reducing safety. Contrary to this, the basic rule of stop signs can be expected to always be strictly observed, *ceteris paribus*, as it is broad enough that following it never hurts its original

purpose. As such, Koenig et al. provide an interesting third perspective into the debate about adherence to rules by confirming that there are indeed rules that need to be broken when the situation demands it; but that there are also rules that should never be broken. However, the idea of basic rules works with the assumption of unchanging circumstances and competent actors. In volatile environments where circumstances change often, even basic rules may be required to change to adhere to new facts. Alternatively, a repertoire of basic rules may be created from which members of an organization can choose a basic rule to follow appropriate to the situation at hand.

The Power of Drill

Rules are also viewed as a container through which knowledge is shared (Kieser & Koch, 2008). A widely used technique for transferring rules is drill, used successfully in sports (Reade et al., 2008), in disaster response (Alim et al., 2015), in military training or when teaching mental procedures, such as mathematical operations (Hsiao et al., 2018). We use the term “drill” metaphorically to generalize it to all methods of repetitive training either at teaching settings or jobs, which require trainees to rehearse methods, rules, tactics and behavioural patterns over and over again until these patterns can be exercised in an automated manner. By making lower level processes effortless and automatic, drill allows more cognitive capacity to be used for higher level thinking. Additionally, drill supplies actors with a repertoire of broad patterns of behaviour and rules, from which those actors can subsequently choose a response appropriate to their situation. This is in accordance with the notion of basic rules (Koenig et al., 2016), which are broad enough to be strictly followed. However, drill has also been criticized in the sense that simple drill leads to rigid patterns of thinking and action, reducing flexibility and potential for novelty (Lehtinen et al., 2017). On the other hand, research in teaching mathematics has shown that if properly supplemented, drill can result in innovative solutions (Baroody, 2003). This resonates well with the notion that knowledge is comprised of multiple components (Gatarik & Born, 2012), as simple drill transfers only one of these components, rules. The other components then need to be transferred in some other way as a supplement to drill.

Training for resilience using drill has, so far, received little attention, with research focused instead on training using scenarios of escalating situations (e.g., Bergström et al., 2011), mental therapy and control of

thought patterns (e.g., Reivich et al., 2011), or coaching (e.g., Grant et al., 2009). Robertson et al. (2015) offer a systematic review of resilience training interventions used in organizations. The connection between outcomes of drill and resilient action also received little attention. Furthermore, it remains unclear what kind of supplementary knowledge allows use of drilled procedures to create new solutions. This chapter fills this research gap by revealing the link between drill supplemented by background knowledge and resilient action in the field in a military organization. Although change of rules has received attention (e.g., Feldman, 2000; Feldman & Pentland, 2003), little has been revealed about how the purpose of a rule may change. For exploring into this we build on the concept of exaptation.

Exaptation

The term ‘exaptation’ is used to refer to the process of using old means to achieve new ends. As an example, Gould and Vrba (1982) tell the story of the exaptation of feathers. The original function of feathers was thermoregulation. Only later have feathers been exapted for flight (Gould & Vrba, p. 11). Exaptation as a concept has since made the leap into other areas of research, such as innovation management and entrepreneurship. In innovation management and entrepreneurship, exaptation has been demonstrated as an important process in the creation of new products and new market niches, with cases such as Viagra, a drug originally developed to counter heart disease, being exapted as a means to combat erectile dysfunction (Dew & Sarasvathy, 2016). Additionally, Ching (2016) found that exaptation has a positive effect on organizational performance by allowing organizations to make use of their old assets or perceived junk in new ways, thereby opening new possibilities.

New insights and ideas often emerge as a result of knowledge exchange between actors from different backgrounds (e.g., Andriani & Cattani, 2016). People come up with new theories and ideas as they perceive reality. These possibilities cannot be fully transferred onto them from other actors or rules, there are always potential new possibilities that emerge from actors’ interactions with their environment, if those actors are given the freedom to make these interactions and the option of making use of new possibilities when they find them (Felin et al., 2016). Exaptation occurs when old assets are used for new purposes. These assets include such that were designed for some purpose, assets that were originally by-products, or assets that had an unknown purpose or no purpose

at all (Garud et al., 2016). This may also apply to knowledge and talent, if organizational conditions allow it. In our case, exaptation is used in the context of learned procedures being used in novel ways to achieve previously unforeseen results. Thus, rules can be the source of not only exploitation, the use of already known solutions, but, through exaptation, also a source of exploration, the creation of new solutions (March, 1991).

EMPIRICAL STUDY

As the empirical context we chose the Austrian Military due to the nature of the environments in which it operates, such as the Golan Heights in Syria, Kosovo, or Chad; places where stakes are high and unexpected events occur frequently, providing a rich source of data about managing surprise. The history of the Austrian Military reaches back centuries, presently relying on professional soldiers, employees and conscripts to achieve its goals. It cooperates with numerous international organizations in peace-keeping missions around the world. The Commander-in-Chief is the Austrian Federal President, though the power of supreme command rests in the hands of the Minister of Defence. The military receives its resources from the federal budget, and its employees are state employees. The goals of the military are set by the interests of the Republic of Austria. From the point of view of publicness, defined as ‘the degree to which organizations are affected by political authority’ (Bozeman, 1987, p. xi; cf. Walker & Bozeman, 2011), this makes the Austrian Military public to a large degree, as a significant portion of its goals and means to achieve them are determined by political authority. However, through certain elements such as cooperation with private entities, for example, interpreters in missions and deployments, the military maintains a degree of privateness.

We rely on theoretical sampling (Eisenhardt & Graebner, 2007), selecting a setting that matches the described problem. Finding patterns that are outside the scope of ordinary management allows us to place into perspective data that would average out across large categories (Starbuck, 1992). By using an extreme setting, we may uncover what makes individuals, groups and organizations able to cope with surprise. Studies of high reliability focus on environments where high reliability is necessary (Achour & Price, 2010; Gittell et al., 2006).

Another reason for selecting the Austrian Military, as opposed to other military organizations, is their unique style of leadership and approach to

training. This doctrine, referred to in this text as mission command tactics (*Auftragstaktik* in German), equips the Austrian Military with high flexibility by allowing autonomy in the decision-making of frontline members in their area of influence (Wittmann, 2012), contributing to the organization's ability to cope with surprise and requiring all members of the Austrian Military (further referred to as 'officers') to be highly trained and well informed. Thus, the setting should provide data concerning methods of employee development.

Research Setting

Respondents for semi-structured interviews were selected based on open-ended pilot interviews with the Editor in Chief of the Austrian Military Journal at the Austrian National Defence Academy, with representatives of the Department for Security Policy and the Department of Planning and Evaluation at the Federal Ministry of Defence and Sports. The pilot interviews resulted in contacts to respondents for semi-structured, narrative-based (Czarniawska, 2004) interviews which provided the core of our data, and in combination with documents also provided triangulation for the ideas that emerged from the qualitative analysis (Jick, 1979; Suddaby, 2006).

Ten respondents were included in semi-structured interviews. These were all men of diverse educational and professional backgrounds and military rank. Seven were commissioned officers (COs), three were non-commissioned officers (NCOs). The NCOs graduated from the Army Sergeant Academy (*Heeresunteroffiziersakademie*) in Enns, Austria. The COs were subject to six years of training and education, including one preparation year, a Bachelor program of three years, and a Master program of two years.

Data collection began after receiving a list of respondents and took place over a period of two months, between November and December 2017. Interviews lasted between 90 and 130 minutes. All interviews were recorded with prior acceptance of respondents, transcribed and sent to their respective respondents for confirmation of accuracy. Data-collection stopped after ten interviews, based on simultaneous data analyses of interviews and supplementary documents revealing category saturation (Strauss & Corbin, 1990).

Analysis

Analysis of interview data follows grounded theory (GT) (Glaser & Strauss, 1967) using techniques of constant comparison, theoretical sensitivity, theoretical sampling and theoretical saturation. First-order categories are generated from personal interpretations of events by people who experienced them (Van Maanen, 1979), utilizing MAXQDA software which facilitated the identification of nestings and overlaps among codes. Based on first-order interpretations, second-order concepts were formulated, which offer a deeper and more theoretical insight into the observed phenomena and their relationships. Two coders met regularly with other members of the research team to gain insight and to be challenged to find alternative explanations for findings. Inter-coder agreement checks were performed to ensure trustworthiness of the research (Lincoln & Guba, 1985).

FINDINGS

We describe the results of our data analysis on the level of second-order concepts leading to a model which connects training practices and behavioural patterns that aid with resilient action in unexpected situations. Although officers train a wide range of routines to guide behaviour, they encounter contexts in which they cannot follow trained procedures. In such circumstances, officers must rely on reflection and evaluation to find new solutions. These include engaging in a set of routines in circumstances different from situations which those routines were created for, as well as completely new actions.

Background Knowledge

...they have been briefed thoroughly on the political situation, which parties exist, we had briefings on each and every minister. We had it before we deployed, and we had it within the mission. And whenever newcomers came, we briefed them again. [R1—01:02:33]

The Austrian Military functions in contexts where it is difficult to predict consequences of actions. Background knowledge of rules stands at the centre of these predictions. It allows the existence of the specific organizational conditions of the Austrian Military and enables behavioural

patterns of its members. Therefore, officers are armed with knowledge from various fields relevant to their deployment, such as local geography, politics and national culture. This additional background knowledge allows them to evaluate their situation with greater richness, as they can contextualize situations appropriately.

One respondent described how during his deployment, he intended to build positive relationships with locals, believing it would contribute to the mission. However, he ran into cultural differences, giving an example of men holding his hand when they walked together down the street. Thanks to his background knowledge of the area and local culture, he knew this was a sign of trust. Therefore, he tolerated the behaviour, as he didn't want to lose the trust of the locals and exhibit hostile behaviour.

Officers are briefed on the history of the conflict that they are trying to resolve. This contextual knowledge allows them to judge the relevance of information. Respondents described situations where context knowledge enabled them to decide correctly, such as whether a course of action which would lead to escalation is appropriate. Similarly, economic and social knowledge is also used to judge whether following guidelines benefit the objective of a mission. A respondent describes how he repeatedly had to make the decision whether to arrest certain types of criminals. He argued that while arresting criminals was generally the right thing to do, in this case, the criminal activity in question was the primary source of income for the majority of the country's citizens. Systematically arresting these criminals would thus result in an increase in overall poverty. The respondent therefore sought different solutions.

Officers obtain background knowledge through a combination of organizational systems of training, and of personally motivated engagement. Regular debriefing takes place following every mission. During debriefing sessions, assessments are made of what did or did not work during the mission, and why. Briefing sessions also happen at the start of a mission, which also repeat every time new officers arrive at the area of deployment, so that they all have the necessary background knowledge. The basis for these briefings, as well as ground rules of engagement and common practices, is regularly updated based on new knowledge. As for background knowledge obtained through personal engagement, this can take place in the form of talks with individuals from the area of deployment, such as expats or refugees. Officers understand that background knowledge is included in their training because wrong behaviour

at the wrong time can lead to failure of a mission. Additionally, background knowledge also allows officers to reflect on their situation in greater detail. This combined with the knowledge of the limits of applicability of routines results in the ability to make good decisions even in volatile situations.

Training

You grip (parachute string) in your right hand, you pull first right, wait two seconds, then you pull left. It works automatically, you do not need to think about it. [R7—00:27:51]

Officers undergo rigorous training to ensure that they are prepared for any challenge. Training takes years and covers a lot of ground. One might say that training in the Austrian Military never ends, as the respondents underwent multiple extra training courses over the duration of their military service. Even during deployment, they keep training and learning new things.

Outputs of training in the Austrian Military include automatized action and possession of background knowledge. Automatized action is the result of drill, a type of training which consists of repeating the same set of steps. Based on data, two interconnected types of drill were identified, pure drill and preaptative drill. Pure drill refers to the basic military training consisting of repeated sets of steps. These sets are repeated until they can be executed without thinking, thus making mental capacity available for other cognition. Pure drill has the goal of enabling *automatized* action, its result can be compared to a guitarist switching the positions of his fingers between chords. A guitarist thinks about which chord to play, not where his fingers need to go. Officers describe experiencing a similar feeling, acting out certain sets of procedures without thinking about the individual steps. Pure drill is also used to teach rules of behaviour in certain situations, what kind of information is necessary for certain decisions, or use of certain equipment. New drilled procedures can be developed during deployment. One respondent stated that they organized a competition with such a goal, which resulted in techniques discovered during the mission being incorporated into drilled procedures.

Learning only through drill may have unintended consequences. A respondent described a situation that almost escalated due to soldiers

following drilled behaviour. Coming suddenly under fire from an unknown assailant, the soldiers prepared their guns and almost opened fire. However, in this case, returning fire would have been the wrong decision. The respondent told his soldiers not to fire and found out that the person firing at them was a panicking policeman. To prevent escalations in such situations, drill is supplemented with education of background knowledge, resulting in preaptative drill. Supplementing pure drill with background knowledge thus results in a readiness to adapt to new situations before these new situations occur.

The second possible supplement to pure drill is experience of new contexts. This gives officers opportunities to consider the application and limits of routines. Unexpected orders require a check of drilled procedures and routines for the possibility of their application and their limitations. Exposure to different contexts in training and experience enhances analogical capabilities which have been found also as part of exaptative innovation (Mastrogiorgio & Gilsing, 2016, p. 1422), where the ability to link different domains of knowledge and experience creates the possibility of ‘creative synthesis’. By combining drill and context learning of background knowledge, officers receive experience of congruity by repeatedly applying routines, as well as experience of disruption of congruity by breaking routines in new contexts. This process has been labelled *punctuated incongruity* by Patil and Tetlock (2014).

Stabilizing the Action System

...I said to myself: wait a minute. What is really important for you now, that the space is narrow, that is not really important. I get enough air, I can move...you must just work through these structured procedures. [R7—00:15:55]

Officers need to cope with situations that put them under high mental and emotional pressure, yet they rarely panic or become disorganized. Instead, respondents reported that even in situations of high stress, they were able to remain calm. They maintain their calm using specific techniques, such as situations assessment, which is trained through drill.

Aside from the drilled situation assessment technique, respondents developed a practice of short-term self-induced tunnel vision. The individual focuses his attention on one point, such as basic biological

functions. After that, the individual expands his focus, thereby preventing himself from being overwhelmed by simultaneously occurring stimuli. Short-term tunnel vision may seem like it would prevent individuals from forming a complete picture of their surroundings. However, for example, Weick (1993) demonstrates that an unstable action system and lost sense of reality leads to a breakdown in operations. Without stabilizing via short-term tunnel vision, the individual would already be unable to take action. Additionally, once stability of the action system is lost, it is very difficult to gain it back again. This means that it may be more beneficial to lose a few seconds of awareness and stabilize the action system, than it is to lose a long time of awareness to lack of stability.

Automatized action contributes to stabilizing the action system in a completely unknown situation by allowing officers to cool down, reflect on the situation and stabilize *while* simultaneously taking steps to reduce the severity of the situation; such as when an officer was able to figure out the reason why his reserve parachute would not open after his primary parachute failed in freefall, while he was undertaking the drilled steps for opening the parachute. Because officers do not need to think about these first-reaction steps, they can instead focus on maintaining their stability, calming down and reflecting. Thus, automatized action may function as a shock absorber.

In addition to drilled procedures, horizontally expanded expertise, *i.e.* learning about things from outside one's primary domain of expertise, allows for successful coping with situations that are completely unpredictable and new. A respondent described how his horizontally expanded expertise allowed him to maintain focus in a new situation. He underwent a training course about landmine injuries, which falls outside his primary domain of expertise, by looking at pictures of such injuries. This course proved essential, as he encountered a landmine accident during a mission after passing the course. The respondent decided to treat victims until help arrived. Though the injuries were gruesome, the respondent was able to keep calm and work through the procedures.

Expanding Option Space

I just came up with that. I thought, how can I get rid of this as soon as possible, as simply as possible? [R6—00:25:13]

Officers often find themselves in situations that can be characterized as existing in *Fog of war*, i.e. an environment where information necessary for timely decisions is not readily available. There is uncertainty, which may be reduced with routines and preparation. There are, however, situations where this isn't an option. One case is situations that have occurred unexpectedly and for the first time, so there are no specific routines to follow. Another case is when the routines are in place, but the situation differs sufficiently from the model situation upon which the rules were based, so the routines do not fit. After the action system is stabilized, it is decided based on sufficient background knowledge whether the routine should be followed, or whether new solutions need to be found. In such cases, officers conduct an analysis of the situation, which serves as basis for future behaviour and is part of automatized behaviour. During the analysis, multiple factors are considered, including the consequences of various options of future action. The result of the analysis is usually a new solution. Expanding the option space provides the opportunity for learning on the individual and organizational level. Once a new solution is found, the individual or group remembers it and may use it again in the future. As for organizational learning, debriefing sessions are one example of processes that allow it.

Coming up with the solution is made possible in part by horizontal expansion of expertise during training. In addition to finding new solutions, analyses enable individuals to choose the right sequence of automatized steps in the right situation. In this context, respondents likened drill to a toolbox from which the right tool is chosen for the right situation. This choice of tool is dependent on sufficient background knowledge about the tool and the situation. If there is enough time for evaluation and reflection, officers rely on a supporting staff composed of Non-Commissioned Officers (NCOs) who provide the analysis and a set of viable solutions. The officer then chooses an option from the set or rejects them all and comes up with his own solution. However, responsibility for the decision lies upon the deciding officer. This structured process generally leads to decisions of higher quality. If there is no time for this approach, the individual must decide alone while maintaining a structured approach, made possible by remaining mentally stable and by possessing knowledge of which factors are relevant in a specific situation. Officers of the Austrian Military are required to possess this knowledge.

A RELATIONAL MODEL BETWEEN SKILL DEVELOPMENT AND RESILIENT ACTION IN SURPRISING SITUATIONS

Our findings show that drill takes the form of teaching routines through repetition, as well as the form of education of background knowledge as a supplement to routines. Drill prepares actors for well-known, expected and recurring situations. Beyond that, drill has implications for dealing with the unexpected, providing officers with the knowledge of routines. This knowledge of drilled procedures enables automatized action, building on autonomous cognitive processes, referred to as Type 1 thinking (Kahneman, 2003; Laureiro-Martínez & Brusoni, 2018). In situations where pressure might lead to panic, automatized action absorbs shock, stabilizes the action system and provides a first response. Possession of routines increases the ability to stabilize the action system, a common behavioural pattern identified in successful dealing with unexpected events, and allows for greater control over one's cognitive processes (Kahneman, 2003).

Drill is supplemented with background knowledge through education to enable reflection during action, re-interpretation and exaptation of those routines. For example, one respondent used his knowledge of aerodynamics and trained practice of moving one's body in the air for the purpose of opening his reserve parachute when it initially failed to open. Supplementary background knowledge transforms pure drill into preaptative drill, by serving as a basis for reflection of potential consequences of actions, limits of rules and their applications in situations of low pressure. This allows for decision-making in situations of low pressure beyond simple rule following and exploitation of routines. The preaptation of drilled routines may facilitate innovation, expansion of option space and change of drilled procedures. Even in situations of high pressure, background knowledge allows for expansion of option space by providing context.

Exposure to new situations provides context to knowledge acquired in training. Obtained expertise allows more appropriate use of drilled routines, if expansion is vertical by repetition within the same type of situation. However, if expertise is expanded horizontally, across different situations, it allows exaptation of learned practices and innovation, as was the case with Respondent 7 who used a rope to send signals instead of a malfunctioning radio. The relationships between the forms of training, knowledge and behavioural patterns supporting dealing with unexpected

Fig. 3.1 Relationships between types of skill development and resilient action in situations of surprise (*Source* Authors' own work, based on research data)

events are visualized in Fig. 3.1. In surprising situations, pure drill supplemented by background knowledge allows automatized action and exaptation of previously learned procedures, thereby allowing actors to stabilize and reflect upon their situation. If this stability and reflection is maintained, appropriate and potentially new solutions may be found that enable actors to maintain operations and identity despite the mental and temporal pressures characteristic of surprising situations.

DISCUSSION AND CONCLUSION

Our research highlights the underappreciated role of drill in dealing with unexpected situations. We distinguish pure drill, capturing its traditional meaning, and preaptative drill, referring to findings in evolutionary biology (Gould & Vrba, 1982). We assume that there are certain forms of drill, analogical to repeating cycles of variation, selection and retention, which provide surplus skills, which eventually prove to be exaptative. Although the concept of exaptation has been explored in organizational literature before in studies of innovation (e.g., Dew & Sarasvathy, 2016),

this study is, to the best of our knowledge, the first to demonstrate the impact of training on the ability to deal with unexpected situations. Our results show that drill, even the pure one, may function as a source or even means for exaptation by providing a pool of learning experiences. Seemingly redundant learning experiences obtained through drill might help to expose and to transfer these patterns or explanatory structures to different contexts. Thus, drill provides tests of the impact of implicit explanatory background knowledge and thus facilitates the adaptation of these patterns. Furthermore, our research results show that rules can act as a shock absorber, which is in line with previous findings (*e.g.* March & Shapira, 1987). However, we expand upon this notion by showing that rules help absorb shock not only by adjusting themselves at the organizational level over time, but also by providing the possibility to act on the individual level while thinking about the current situation and coming up with new ideas. We also shed light on the role of rules in exploration processes (March, 1991) as a facilitator of finding new solutions.

This chapter contributes to discussion of training and management development, presently mainly focused on cognitive learning and single events of experiential learning (*e.g.*, Shotter & Tsoukas, 2014; Waddock & Lozano, 2013), by revealing possible links between different types of drill and the ability to manage surprise. The results show that both forms of drill contribute to managing surprise. Pure drill provides behavioural patterns and skills, which enable automatized action in situations where pressure is too high for reflection. Automatized action is a result of exaptation of behavioural patterns gained through pure drill. Pure drill can be enhanced by background knowledge of rules through education and experience, leading to preaptative drill. Education about explanatory background knowledge leads into the research of cognitive science (*e.g.*, Born & Gatarik, 2013; Bruner, 1990) leading to an ability to understand when and why behaviour should follow a given stimulus. Preaptative drill therefore facilitates coping with unexpected situations in which individuals still have time and internal stability to reflect.

The study findings suggest that incorporating explanatory background knowledge of learned behaviours into training may contribute to coping with surprise. This topic deserves further exploration, including the presence and impact of preaptative drill in other fields, *e.g.* how education or background knowledge can be effectively integrated into organizations' training systems. The links between background knowledge in training and behaviours leading to successful coping with unexpected situations

need to be reinforced with further research. This can be realized using investigations similar to the one described in this chapter, within new contexts, such as business organizations, and organizations in cultures different from the organizational setting investigated in this study. These investigations should focus on discovering cases that either support or refute the links suggested here.

The fact that our data are derived from the military contexts implies both limits and additional conclusions. Owing to its high degree of publicness (Bozeman, 1987), certain limitations are placed on the Austrian Military and its members, such as Rules of Engagement for certain missions, international law, or guidelines of international mission coordinators, such as NATO. Although these limitations certainly constrain decision-making, they may also guide it and serve as additional rules in the already wide toolset of military servicemen in surprising situations. Adherence to these kinds of rules does, however, contribute to the uniqueness of the Austrian Military as a subject of research, and their existence should be kept in mind when interpreting the results of the research. The public sector in general, including such heterogeneous fields like the military or health care, is highly institutionalized and regulated through a plethora of rules. Thus, the discussion of rules in this chapter and the insights into drill as a source of exapted rules has special relevance for this sector. In addition, however, other sectors which are usually considered to be more dynamic and where both rules and drill are frequently dismissed as hindering adaptation to new developments might reconsider the necessity for drill.

Although our research focuses on the antecedents of individuals' ability to handle surprise, some broader conclusions at the organizational level can be made. So far, an organization's explorative capabilities have been proposed to be dependent primarily on structural conditions, such as its ambidexterity (Gibson & Birkinshaw, 2004) or environmental moderators (e.g., Jansen et al., 2006). Our results suggest that training and background knowledge for continuous development of organizational code may simultaneously enhance an organization's capability for exploitation and exploration. In these contexts, rule-breaking has obtained overly negative connotations in literature and in practice. We follow up on the idea of rule-breaking with the notion of preaptative drill, which points to the necessity of both rule-following and rule-breaking, the latter being contingent upon sufficient background knowledge. The findings of our

research especially highlight the role of explanatory background knowledge as essential for resilient behaviour in critical situations. Together with drill to learn rules, for which we used the term exaptative drill, this could be also paraphrased as reflective and corrective use of rules. Such utilization of rules depends on knowledge of how those rules were created to understand the limits of the application of rules based on context. How the neglect of context-dependence may lead to disasters has been shown prominently in several reports (e.g., Weick, 1993).

Generalizing from individual behaviour, which was the focus of this chapter, we propose that enabling for reflective correction in the application of explanatory knowledge provides the basis for survival even in rigid organizations and can help stabilize the system and secure resilience in critical, unexpected situations. Our findings, summarized in Fig. 3.1, provide some guidance for designing training systems and policies. Drill should not only be established to train behaviours in single situations, but the context of training shall be changed to allow to test behaviours in different situations and to force reflection on the power of drilled procedures. This provides rules and trained procedures with a surplus as a first basis for exaptation of rules. This may be combined with courses and seminars which provide background knowledge on the coming about of rules, their history, and their ultimate goal.

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