Variants of drill as preparations for responding to surprising events

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Abstract

Purpose – This paper aims to contribute to research on management training and development by exploring the impact of extensive training labeled as drill on coping with critical situations. More specifically, it inquires into conditions and supplements for drill to move from mere adaptation to exaptation, relating to the transfer of drilled procedures to serve novel requirements, in events involving different types of surprise.

Design/methodology/approach – The paper adopts an interpretive research approach. Data were collected through semi-structured interviews with members of the Austrian Military on cases of resilient field action in manifold situations of surprise.

Findings – The paper reveals that two different kinds of drill lead to properties that are essential for recovery from shock during critical events: the pure drill and the preaptative drill. Pure drill enables automatized action in situations when time or emotional pressure is too high for reflection or consideration of different options. Preaptative drill, pertaining to drill enhanced with background knowledge, leads to adaption or even exaptation of automatized action through reflection.

Originality/value – The present paper is the first to show the potential impact of drill on the ability to deal with specific kinds of surprise. It suggests that incorporating explanatory background knowledge about why and how rules and learned behaviors that were created into training programs can be of vital importance for dealing with surprise successfully.

Keywords Management development, Exaptation, Dealing with surprise, Explanatory background knowledge, Preaptative drill, Pure drill

Paper type Research paper

Introduction

At the end of April 2018, an article appeared on the Internet called Massaker am Golan – the Golan Massacre (Klenk, 2018). The article was accompanied by video footage of the event described in the article, which happened in the Golan Heights in September 2012. The video depicts nine members of the Syrian security forces being shot dead by 13 gunmen described as Syrian "smugglers" and was being filmed by members of the Austrian Military. These members of the Austrian Military were aware of the presence of smugglers in the area and had the opportunity to warn the Syrians of the possible danger. However, they were also under the influence of the UN, whose stance in this region is "never interfere, just observe and report". However, what kind of behavior has to be interpreted as "interference", thus, as disobeying the order, or as a mere act of humanity remains subject to interpretation. Still, the young soldiers of the Austrian Military chose to "follow the rule", and – except the rather "equivocal" (Weick, 1979) warning to the Syrian police unit "Take care! Take care!" (Weißensteiner, 2018) – do nothing, instead of trying to find a more effective solution in this

unexpected situation. Additionally, the video does not depict them trying to contact a higher officer to confirm that they should follow that rule.

As described in this introductory vignette, individual actors, groups and organizations may be caught by surprise either if something entirely new or if something familiar is happening in an unexpected or in an untimely manner, requiring immediate action. Such occurs in innovative contexts, in crisis situations, or even when working on routine tasks, as our introductory case of the Austrian UN peacekeepers demonstrates. Despite considerable research into behaviors in such situations (Aaltonen *et al.*, 2010; Bechky and Okhuysen, 2011; Weick and Sutcliffe, 2015; Landman *et al.*, 2017; Villemain and Godon, 2017), and on training for high reliability contexts (Vogus and Welbourne, 2003; Weick and Sutcliffe, 2011), such as in the medical domain (Edmondson *et al.*, 2001), there is surprising little knowledge on antecedents of the ability to cope with the unexpected, neither on the individual, nor on the group level. In this paper, we explore the impact of training for coping with different types of surprise. More specifically, we focus on extensive training of rules and behavioral patterns, labeled as "drill".

At first sight, drill, by its repetitive and non-reflective manner, may appear detrimental in a search for novel solutions, for new tactics, and for coping with unexpected events. It may promote rigid rule following with potential harmful results. Drill, however, may be a necessary preparation for quick action, for adaptation of rules or for application of rules and for the adaptation of trained behavioral patterns to novel situation, labeled as exaptation (Andriani *et al.*, 2017; Gould and Vrba, 1982). The main aim of our research is to inquire into conditions and supplements for drill to move from mere adaptation to exaptation when caught by surprise.

We start by defining variants of drill, especially "preaptative drill" in contrast to "pure drill" and by reviewing literature on training and its impact on rule following and behavioral patterns. This provides the basis for our qualitative study of military officers, their training and their behaviors in crisis situations. As a result, we propose a model which links variants of drill to modes of dealing with surprising, unexpected events and with patterns of behavior in unexpected and unprepared for situations and their "assumed" potential outcomes. Finally, we discuss the generalizing of our model especially to organizational and innovation contexts, where high levels of ambiguity and uncertainty are pertinent.

Defining drill as preaptative
"Drill" in the military context refers to an authoritarian, coercive method of intensive training of behavioral patterns. We use the term "drill" metaphorically to generalize it to all methods of repetitive training either at teaching settings or on jobs, which require trainees to rehearse methods, rules, tactics and behavioral patterns over and over again until these patterns can be exercised in an automated manner. In addition to such pure drill, we investigate and consider "preaptative drill", that is drill supplemented through teaching, learning and integrating background knowledge on the history of the rules' evolution, their motivation, their potential consequences, as well as explanatory ideas. To put it in a more generalized way, drill is defined as preaptative if trainees also learn the theory behind the drill. The label "preaptative" refers to Gould and Vrba's (1982) conception of *exaptation* and *preaptation*. As an example, they tell the story of the evolution of feathers. According to received wisdom, originally animals grew feathers for thermoregulation. Only later on feathers have been exaptated for flight (p. 11). Thus, "preaptative drill" should empower trainees to adapt behavioral patterns for new purposes if they are caught by surprise in novel or unexpected situations.

Drill, as we shall argue and demonstrate by way of our qualitative empirical study, can provide or build up a new exaptive (meta-) property originally not intended by learning the rules and routines, sometimes in a seemingly paradoxical way. Just applying a routine in a critical situation in a more or less mechanical way may allow well trained people to clear their mind both for the limits of the application of the entrenched rules, but also for innovative

application, improvisation and for new solutions. It should help to win time, while instantiating the drilled in routines. What is essential in this case is to be aware of and to understand the influence of background knowledge, as it has been discussed as "split semantics" in reflecting "artificial intelligence" (Born, 1988/2018) or in considering the relation between language, information/knowledge and reality in the context of formal semantics or model-theory (Born, 1993).

Hence, drill, even the pure one, may function as a source or even means for exaptation, by providing a pool of learning experiences (a similar case was put forward by Gould and Vrba regarding repetitive DNA). Seemingly redundant learning experiences during the repeated rehearsing of behavioral patterns might help to transfer them or their underlying explanatory structures to contexts for which they have not been developed originally. In this regard drill provides tests of implicit explanatory background knowledge, of their impact and thus facilitates the adaptation of these patterns. This has already been described in a similar way as "deutero-learning" and has been exemplified through a training sequence of dolphins by Gregory Bateson (1973).

Empirical study: coping with surprise in the military
Research context
We chose the Austrian Military as our research site, first, because its members are exposed to unexpected situations on a regular basis; and, second, because of the organization's specific approach to training and skill development. The Austrian Military participates quite frequently in deployments in high-risk areas, such as the Middle East and Africa. Additionally, this organization's specific doctrine, the mission command tactics (*Auftragstaktik* in German), makes it remarkably well equipped for flexible and quick reactions by giving members local autonomy on their region of influence (Wittmann, 2012), which usually enables members of the Austrian Military to cope with unexpected situations effectively and sustainably.

This doctrine requires and is supported by extensive training and education of all members of the organization (Wittmann, 2012), which in the Austrian Military can last up to nine years officially, followed by regular training in members' later careers. Training in this organization provides its members not only with knowledge of rules and standard procedures, but it aims especially at understanding of the limits of these rules, of the reasons why those rules were created, and when they should or should not be applied. The main goal of the empirical study was to show how attention to background knowledge surfaces in training and to describe in detail its consequences, which will be explained in more detail in the text below. Considering the importance of the types of training that the Austrian Military uses to develop its members and considering how little attention this training has received in research so far thorough exploration seems highly justified.

Data collection
Data for analysis were collected via interviews with members of the Austrian Military. The collection process began with open-ended pilot interviews at the Austrian National Defense Academy with the Editor in Chief of the Austrian Military Journal, and at the Federal Ministry of Defense and Sports with representatives from the Department of Planning and Evaluation and the Department for Security Policy. In addition to the pilot-interviews, archival data were also collected, such as excerpts from historical books, articles published by the media of the Austrian and German Armed Forces, and especially written reports of officers participating in international missions, if they contained experiences with unexpected situations, such as, for example, being taken as hostage during a mission as

military observer in Tajikistan. The main goal of these pilot interviews and documents was to gain an understanding of the historical, cultural and organizational context within which members of the Austrian Military operate. This understanding is essential if the success with coping with unexpected events is to be reproduced in other contexts, such as the business sphere. The pilot interviews and documents also served as a source of triangulation for the ideas that emerged from the qualitative analysis (Jick, 1979; Suddaby, 2006) and for causally connecting categories derived from interviews. Finally, pilot interviews provided access to additional respondents for primary data gathering through semi-structured interviews.

The use of semi-structured interviews resting upon the technique of narratives (Czarniawska, 2004) for primary data collection was based on the necessity of obtaining contextual data and personal interpretations of critical events for the creation of first and second-order concepts. Semi-structured interviews allow respondents to elaborate in more detail on their experiences and perceptions and enable researchers to ask follow-up questions in case the topic needs to be explored deeper.

Respondents for the semi-structured interviews were suggested and selected by the Head of the Department for Science, Research and Development from the Austrian Ministry of Defense, who also facilitated contact with the respondents. This means that the sample for this research was not random. This approach was chosen due to the specific demands that this research places upon respondents: a rich repertoire of situations, in which the individual needed to cope with unexpected situations, and a willingness and ability to recollect such events. In this way, 10 respondents of various military ranks, educational and experiential backgrounds were selected for the semi-structured interviews. The respondents included seven commissioned officers and three non-commissioned officers. The decision to stop data-collection after 10 interviews has been based on simultaneous data analysis of interviews and supplementary documents revealing category saturation (Strauss and Corbin, 1998). As the review by Sim *et al.* (2018) shows samples size of qualitative studies can hardly be determined *a priori* and vary from 3 to over 50 cases. However, most studies aiming at theoretical saturation stop at sample size similar to the present study when facing a rather homogenous population (Kuzel, 1992; Onwuegbuzie and Leech, 2007) like it is the case for our group of military officers.

Data collection through semi-structured interviews began immediately after receiving a list of respondents willing to take part in our research and took place over a period of two months, between November and December 2017. The interviews lasted between 90 and 130 min each. After asking respondents about their missions and selecting situations which they reported to contain surprising events narrations where structured through open questions like "what happened?", "what was the problem?", "who were the actors?" and "how did you react?". Interviews were recorded with prior acceptance of respondents. These recordings were then transcribed and sent to their respective respondents for confirmation of accuracy of transcription. The respondents' anonymity was guaranteed through a written agreement.

Data analysis
As a qualitative study we followed a theory development approach based on individuals' interpretations (Glaser and Strauss, 1967), constantly comparing with extant theory and literature (Suddaby, 2006), which is an established approach used in several previous studies (e.g. Browning *et al.*, 1995). First order concepts were identified by coding individual statements in the interviews in an exploratory manner. On the second level, these were used to derive and identify second-order constructs by aggregating similar first-order categories. For this, interview data were connected with background information described above.

Finally, and going back to transcripts, second-order concepts have been linked to represent and exhibit causal connections between training categories and behavioral categories as they were reported to explain unexpected situations. To structure data analysis, MAXQDA software was used which aids in the creation and attribution of codes to statements over multiple instances. The program also facilitates the identification of nestings and overlaps among codes.

Two coders met regularly with other members of the research team in order to gain useful insight, suggestions, and to be challenged to find alternative explanations for findings. Inter-coder agreement checks were performed so that the trustworthiness of the research could be ensured (Lincoln and Guba, 1985).

Findings

Figure 1 summarizes results of data analysis, showing first and second-order categories, together with representative citations which characterize either actions in situation with unexpected conditions or aspects of training which has been enacted as relevant for these situations by respondents. For example, second order category "Communication style preserving identity" was inferred from three first order categories "Trust building", "Shared values" and "Respect". The latter was based on cites like "... you need compromises, compromises, compromises", which were interpreted by coders to reflect the need to respect the interest of other parties with which officers were dealing.

Connections between drill and managing surprise

At the next stage of data analysis, we identified aspects of interview data which allowed for a causal ordering of the second-order categories. This is described in the following with illustrative quotes of respondents, leading to a model connecting variants of drill and training and coping with unexpected situations. This resulted, first, in distinguishing two types of drill and two types of dealing with surprise, which appeared to be strongly connected: pure drill and preaptative drill. The second and final stage of analysis is described further below.

Pure drill and preaptative drill

In our context, pure drill represents basic military training, which consists of extensive rehearsals of certain behavioral patterns over and over again. As one respondent described it:

> And then, the military training, the drill, to do procedures and movements again and again and again, something you already know, something you are already able to do and use. And do it one hundred times, two hundred times. [R3 – 00:41:22]

Such training has the ultimate goal to enable and enforce "automatized action". The same respondent: "*I did not even think what to do; I just worked, like a robot. And whatever I did, I did automatically.*" [R3 – 00:42:12]

All soldiers, from the lowest to the highest ranks, are exposed to this type of drill. We identified two ways to supplement this type of drill which eventually result into "preaptative" drill. First, respondents report exposure to and learning of background knowledge on the reasons, the motivation and the limits of trained patterns, tactics, strategies and rules. This supplement, at least within the scope of investigated data, seems to be present primarily at the "Military Academy", and is restricted to prospects for higher ranks. Second, exposure to experiences on novel contexts prepares respondents for the application of trained patterns and rules. While pure training is done in familiar training contexts within barracks, training grounds, a certain cultural context and
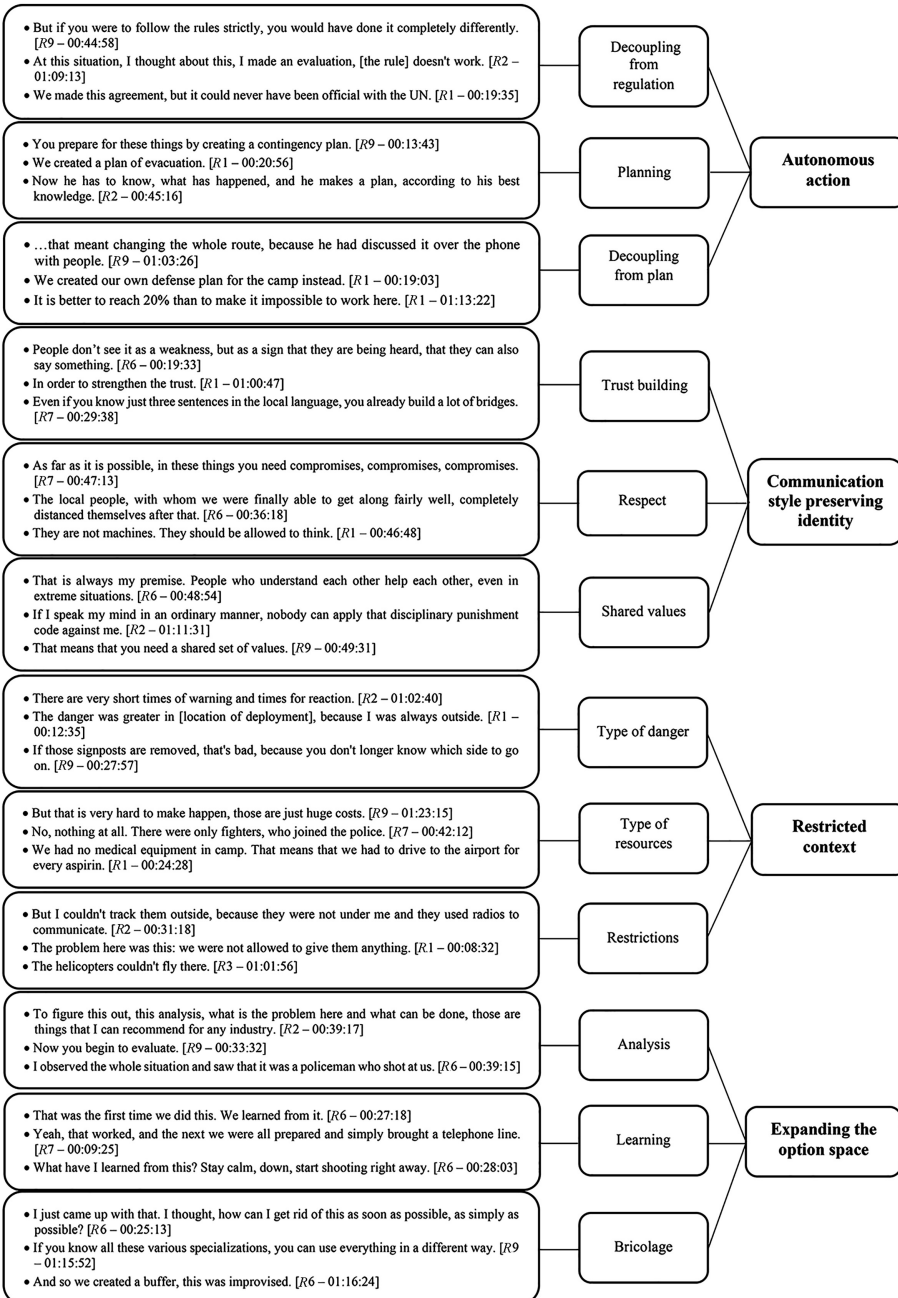
- But if you were to follow the rules strictly, you would have done it completely differently. [$R9 - 00:44:58$]
- At this situation, I thought about this, I made an evaluation, [the rule] doesn't work. [$R2 - 01:09:13$]
- We made this agreement, but it could never have been official with the UN. [$R1 - 00:19:35$]

→ Decoupling from regulation

- You prepare for these things by creating a contingency plan. [$R9 - 00:13:43$]
- We created a plan of evacuation. [$R1 - 00:20:56$]
- Now he has to know, what has happened, and he makes a plan, according to his best knowledge. [$R2 - 00:45:16$]

→ Planning

→ **Autonomous action**

- …that meant changing the whole route, because he had discussed it over the phone with people. [$R9 - 01:03:26$]
- We created our own defense plan for the camp instead. [$R1 - 00:19:03$]
- It is better to reach 20% than to make it impossible to work here. [$R1 - 01:13:22$]

→ Decoupling from plan

- People don't see it as a weakness, but as a sign that they are being heard, that they can also say something. [$R6 - 00:19:33$]
- In order to strengthen the trust. [$R1 - 01:00:47$]
- Even if you know just three sentences in the local language, you already build a lot of bridges. [$R7 - 00:29:38$]

→ Trust building

- As far as it is possible, in these things you need compromises, compromises, compromises. [$R7 - 00:47:13$]
- The local people, with whom we were finally able to get along fairly well, completely distanced themselves after that. [$R6 - 00:36:18$]
- They are not machines. They should be allowed to think. [$R1 - 00:46:48$]

→ Respect

→ **Communication style preserving identity**

- That is always my premise. People who understand each other help each other, even in extreme situations. [$R6 - 00:48:54$]
- If I speak my mind in an ordinary manner, nobody can apply that disciplinary punishment code against me. [$R2 - 01:11:31$]
- That means that you need a shared set of values. [$R9 - 00:49:31$]

→ Shared values

- There are very short times of warning and times for reaction. [$R2 - 01:02:40$]
- The danger was greater in [location of deployment], because I was always outside. [$R1 - 00:12:35$]
- If those signposts are removed, that's bad, because you don't longer know which side to go on. [$R9 - 00:27:57$]

→ Type of danger

- But that is very hard to make happen, those are just huge costs. [$R9 - 01:23:15$]
- No, nothing at all. There were only fighters, who joined the police. [$R7 - 00:42:12$]
- We had no medical equipment in camp. That means that we had to drive to the airport for every aspirin. [$R1 - 00:24:28$]

→ Type of resources

→ **Restricted context**

- But I couldn't track them outside, because they were not under me and they used radios to communicate. [$R2 - 00:31:18$]
- The problem here was this: we were not allowed to give them anything. [$R1 - 00:08:32$]
- The helicopters couldn't fly there. [$R3 - 01:01:56$]

→ Restrictions

- To figure this out, this analysis, what is the problem here and what can be done, those are things that I can recommend for any industry. [$R2 - 00:39:17$]
- Now you begin to evaluate. [$R9 - 00:33:32$]
- I observed the whole situation and saw that it was a policeman who shot at us. [$R6 - 00:39:15$]

→ Analysis

- That was the first time we did this. We learned from it. [$R6 - 00:27:18$]
- Yeah, that worked, and the next we were all prepared and simply brought a telephone line. [$R7 - 00:09:25$]
- What have I learned from this? Stay calm, down, start shooting right away. [$R6 - 00:28:03$]

→ Learning

→ **Expanding the 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? [$R6 - 00:25:13$]
- If you know all these various specializations, you can use everything in a different way. [$R9 - 01:15:52$]
- And so we created a buffer, this was improvised. [$R6 - 01:16:24$]

→ Bricolage

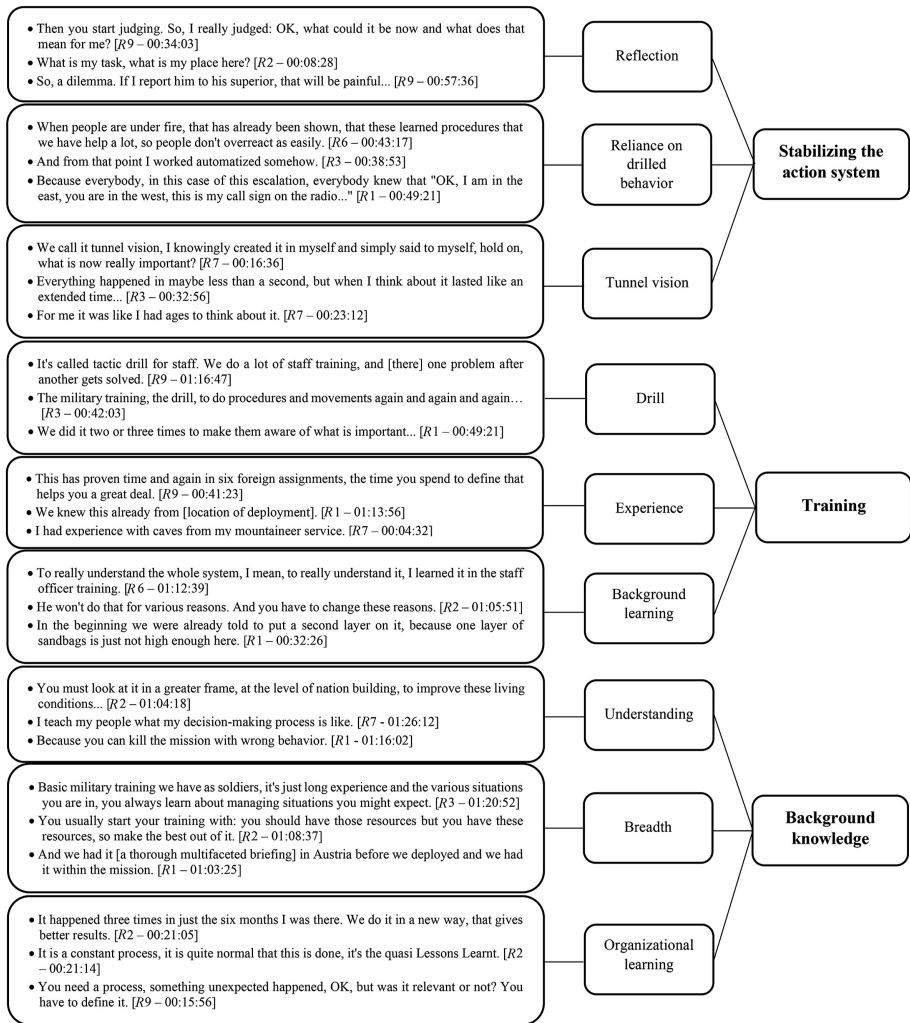**Figure 1.**
Data structure

(*continued*)

Figure 1.

utilizing stylized training scenarios, actual missions expose individuals to novel cultures and situations for which they have not been prepared. Additionally, unexpected orders require probing of drilled practices for their applicability, adaptability and limitations. As one respondent indicated:

> What was important to me was cultural awareness. My advantage was, that I had won not only in Afghanistan, because that all would be a work culture, but here I learnt what concerns punctuality, reliability and so on. [R1 – 01:05:18]

Exposure to different contexts in training and experience enhances analogical capabilities which have been found also as part of exaptative innovation (Mastrogiorgio and Gilsing, 2016), where the ability to link different domains of knowledge and experience opens up the possibility of "creative synthesis" (p. 1,422).

Automatized action and reflective exaptation

> It was stupid, I already know it, but this drill is what saved the lives of the others. Because from that moment came out I did not even think what to do, I just worked, like a robot. [R3 – 00:41:56]

This quote is part of a respondent's description of rescuing himself and his peers from an avalanche which they had been buried under. Because of the extremely high time pressure to save his peers from death by suffocation, he was unable to plan his actions or to search for options. He needed to act "like a robot". This automatized action ultimately saved the life of four of his peers. This applies also to some extent to new and highly ambiguous situations, for which there was no previous specific training:

> But, in fact, such a situation is always chaos if there is not a fixed procedure. And here you only need one or two keywords and this group works according to a defined standard procedure. You can rehearse it again and again, and if you know that for the situation fits this standard process, then you apply it and everything else works by itself. [R7 – 01:22:16]

In other situations, however, such automatized action was neither feasible nor necessary, because the time pressure was less severe. For example, when one respondent describes a situation where he had to deviate from his pre-defined "job description":

> These were not operative strategic tasks to put 30 people for the protection of five containers. [R1 – 01:05:18]

Respondents describe their reflecting thoughts and how they adapt learned and drilled patterns to cope with such surprising challenges.

> No matter what kinds of unpleasant things are still about to come, they are not really important. And then you need a few moments from time to time to focus on what is really important, and then you can do it all properly. [R7 – 00:16:40]

This is in line with findings in high reliability organizations (Gardner *et al.*, 2017) that automatized action in the sense of adherence to specific routines facilitates mindful use of routines as defined by Weick and Sutcliffe (2006).

> In the beginning we were already told to put a second layer on it, because one layer of sandbags is just not high enough here. [R1 – 00:32:26]

> [. . .] that meant changing the whole route, because he had discussed it over the phone with people. [R9 – 01:03:26]

> We created our own defense plan for the camp instead. [R1 – 00:19:03]

> You cannot be trained for everything, but you can be trained for standard situations and then . . . it's like a toolbox, then it is up to you . . . to take out of the toolbox all this training you learned to put it together, and assemble it for this specific situation. . . [R9 – 00:21:20]

To summarize, our analysis of co-occurrence of types of drills and of ways to deal with surprising events identifies two conditions:

(1) In situations where time pressure and/or emotional load of the situation might lead to panic, training enables and supports automatized action, building on autonomous cognitive processes – sometimes characterized as system or type 1 thinking (Kahneman, 2003; Laureiro-Martínez and Brusoni, 2018). In such situations explanation and reflection is replaced by "loslassen" (letting go, i.e. accepting the inevitable ending of life in the sense of "distancing" oneself to a situation) as a necessary condition for automatized action.

(2) When time pressure is no longer the ultimate concern, training allows for more controlled cognitive processes (Kahneman, 2003), reflection and re-interpretation of

rules (exaptation). Automatized action, necessary in situation (1), is often reported to be a precondition at arriving in situation (2) where exaptation is possible. Then, *preaptation* of drill (based on background knowledge and reflective correction in practice) can lead to adaptation or to a change of automatized action, and thus to stabilizing the action system.

In the final step of analysis, we combined interview data with information from archival data and theoretical considerations to arrive at a causal ordering of the identified second order categories, from, first, training, to, second, the acquisition of a specific communication style which preserves identity, and to the building up of background knowledge. All of these are preconditions for autonomous action during missions, which surfaces through the ability to stabilize the action system and through expanding the available options space for dealing with surprising situations. Explanatory meta-reflection can lead to innovation by expanding and enriching the original option-space and the solution-space. Finally, it can create or install an action space to support organizational resilience. This is represented in Figure 2.

Discussion and conclusions

Drill, that is the repetitive learning of routines and patterns of behavior is usually treated as a trivial part of training and as preparing for routine situations only. With this study we aimed at exploring its role in situations where actors face unexpected developments. We identified two types of drill, which fulfill rather different functions. First, pure drill refers to a traditional understanding of drill, whereas, second, preaptative drill, utilizing a concept from evolutionary biology (Gould and Vrba, 1982), allows for quick adaptation and resilient action in surprising situations. While this concept has been applied in the organizational literature before especially to innovation processes, the present paper is the first to show the potential impact of training and drill under novel, surprising and non-routine circumstances. Still, pure drill allows for automatized action, both in routine and in novel situations which is
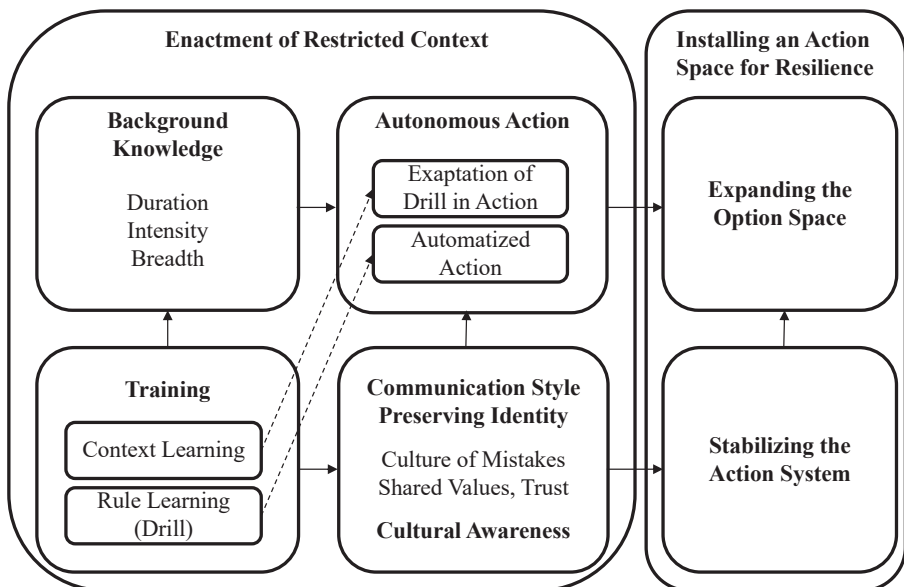
Figure 2.
Relationships between types of drill and managing surprise

essential under strong time pressure or under any stressful condition. However, pure drill fails when routinized behavior is no longer appropriate for a given situation. Instead, we show that preaptative drill allows for expanding the necessary options space to find solution which provide for successful resolution of problem states. Training for this relies especially on the acquisition of background knowledge, in particular knowledge into the evolution of trained rules, including reflections on the reasons and theoretical justifications on which rules are based on.

The results of this research suggest that incorporating explanatory background knowledge about why and how rules and learned behaviors were created into training programs can be of vital importance for successfully coping with surprise. Therefore, our results should act as a starting point for exploring further possibilities into ways education in regard to background knowledge can be effectively integrated into training systems of organizations. Perhaps most importantly, however, the links between incorporation of background knowledge into training and behaviors leading to successful coping with unexpected situations, including creation of new solutions in such situations, need to be reinforced with further research. As this study is based on data from a special military organization its result cannot be generalized deliberately. Therefore, further research is called for in other contexts, both with other types of surprising situations and where training is of different nature.

Still, the conditions of our research setting suggest possibilities for transferring and generalization of the present findings to domains where specialized experts need to respond quickly to surprising developments. This is the case, for example, in many so-called high reliability organizations, like hospitals, energy plants or in aviation. Further, our research contributes to the explanation of frequently observed failing responses of highly trained experts in regular fields. Therefore, we maintain that training for a wide range of organizations would benefit from our distinction between pure drill and preaptative drill, on the one hand, and the associated training of background knowledge, on the other hand, whenever experts are exposed to situations which significantly deviate from routine. Also, the finding that teaching of background knowledge is often restricted to higher ranks surely will be found also in management contexts beyond the military. In contrast to such a practice, our results suggest that the acquisition of background knowledge on all levels of management might significantly enhance the resilience of organizations in a wide range of contexts. While the notion of drill might not be accepted in management, its underlying idea, that is the quick and automatized application of behavioral patterns, surely is also found in management. Therefore, an equivalent distinction between pure drill and preaptative drill, based on the acquisition of background knowledge is surely relevant in a wider management context. Further, while our study has been located in a context where innovation is not the ultimate, primary goal, the type of surprise encountered in military situations resembles in many aspects unexpected events in innovative contexts. Generally, for all of these domains, we propose a new understanding of the relationships and influences between the studied types of drill, their associated needs for training and education and their impact on innovative and resilient behavior.

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