



HAL
open science

How Do Simulated High-Intensity Situations Train Leaders to Maintain Their Ability to Act in Unfamiliar, Unforeseen or Uncertain Environments?

Herve de Bisschop, Serge Leblanc

► **To cite this version:**

Herve de Bisschop, Serge Leblanc. How Do Simulated High-Intensity Situations Train Leaders to Maintain Their Ability to Act in Unfamiliar, Unforeseen or Uncertain Environments?. Simon Flandin; Christine Vidal-Gomel; Raquel Becerril Ortega. Simulation Training through the Lens of Experience and Activity Analysis, 30, Springer International Publishing, pp.237-258, 2022, Professional and Practice-based Learning, 978-3-030-89567-9. 10.1007/978-3-030-89567-9_12. hal-03677879

HAL Id: hal-03677879

<https://institut-agro-dijon.hal.science/hal-03677879>

Submitted on 25 May 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?

Cases from crisis preparedness training at the *École Militaire Interarmes*¹.

Hervé DE BISSCHOP* and Serge LEBLANC**

*UR « Formation et Apprentissages Professionnels » (herve.de-bisschop[at]agrosupdiyon.fr)

** Université de Montpellier- LIRDEF (serge.leblanc[at]umontpellier.fr)

1. INTRODUCTION

The research objective, object, theoretical framework and setting

This research aimed to advance the design of simulations that prepare professionals to act effectively in particularly intense, indeterminate and difficult situations. As such situations can be overwhelming, the challenge for trainees is to maintain their capacities to act effectively, which might even be described as the singular experience of being prepared not to be prepared. The study thus focused on the trainees' lived experience by analyzing the various ways they engaged in action. The approach was based on (i) theoretical postulates derived from the theory of action and (ii) the empirical study of an emblematic program that appears to be promising, relevant, and effective: training whose main purpose is to immerse learners in an uninterrupted succession of simulated situations that continuously impede their actions.

Studying the modes of engagement that trainees experience as they are trained to lead

¹ EMIA: Joint Military School.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

This chapter has five sections. First, we describe why the setting for this research and its specificities are relevant to our objective. Second, we present an explanation of why the enactive and semiotic conception of activity is well-suited to provide insight into how trainees experience different modes of engagement as they learn to lead in hostile environments. Third, we describe the key points of the study methodology. In the fourth section, we present the results, notably a unique mode of engagement developed by the trainees, and propose six principles propitious for designing training programs dedicated to training professionals to act in risky, dynamic and unpredictable environments. Last, we conclude by presenting an opening onto a new perspective related to a second transformation experienced by the trainees: that of their attentional capacity.

2. CONTEXT AND CHALLENGES

Specificities and relevance of the study setting

We begin by describing the main characteristics of preparedness training. We then specify how this simulation program is relevant for studying how trainees live the experience of maintaining their capacities to act in uncertain and demanding environments.

2.1 Preparedness training: a program of continuous simulations that challenge firefighters, police officers and soldiers with intense and unusual disturbances

Preparedness: training by dealing with intense physical, psychological and technical difficulties

The training courses take place in French Guiana at the *Centre d'Entraînement en Forêt Équatoriale*.² It is designed for civil and military security professionals: firefighters, police officers

² CEFE: Equatorial Forest Training Centre.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

and soldiers. The CEFE instructors have been certified by the most demanding “jungle” schools³ in the world. The course is based on the principle of preparedness, which “is a set of procedures and individual and collective situations that contribute to improving the trainees’ operational aptitude [...] by confronting them, under orders from their leaders, with the physical, psychological and technical difficulties that arise while executing their missions in unusual and hostile conditions and environments” (*Etat-major de l’armée de terre* 2010, p. 3⁴). Essentially, this means “giving every soldier, within his formation, the ‘non-material’ means to fulfill his mission” which entails dealing with the environment of right now; resisting over the long term; overcoming adversity; knowing sometimes how to endure the unendurable; being convinced of “getting out of the trenches” whatever the risk and of not being alone to do so; showing situational intelligence and initiative; and being able to adapt to unusual or unforeseen circumstances and technological failures (Ibid., p. 4).

A unique simulation program

This professional training is based on lengthy, high-intensity simulations unfolding over 20 days. The trainees are immersed in a hostile environment: the equatorial forest, which “can quickly become the first and the worst enemy for untrained or ill-prepared troops” (Walter 2015, p. 214). The trainees thus must deal with adversity through exposure to simulated, unusual, unforeseen, and even unbearable situations.

In practice, this course differs from simulations organized along the classic format of briefing/immersion/debriefing. Here, the simulation is organized around three main modalities: (i)

³ Brazil (CIGS of Manaus), Colombia (Lanceros) and Ecuador (Tigre).

⁴ General Army Staff Note 727/DEF/EMAT/ES/B.EMP/OUT/33, April 2010.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

intensive training comprising practical situations (e.g., crossing water, survival, obstacle courses, lighting fires, night orienteering, medical evacuation, round-the-clock life in the forest, etc.); (ii) ongoing instruction (e.g., on fauna, flora, hunting, hygiene rules, topography, construction of shelters and rafts, etc.) to ensure that the trainees acquire vital knowledge about dealing with survival situations and develop new modes of action in aversive environments; and (iii) the transmission of experience by senior peers (the instructors, seconded by the captain in charge of officer cadet training).

In addition, preparedness training holds a specific place in the field of simulation training because, like simulators, it is based on a realistic reconstruction of the professional situations that future officers must be prepared for. Unlike simulators, however, it does not use technological devices to reproduce or simulate reality. Preparedness training is, in fact, situated in an in-between place, being both inside and outside the professional activity. Although the situations the trainees confront are simulated and the instructors play parts in them, all takes place in a real environment: the equatorial forest. This natural and hostile environment exposes the trainees to risks that will force them to learn to act effectively in response.

In summary, one of the originalities of this research is its focus on the trainees' experiences of learning while they engage in exercises that in no way facilitate their activity, but instead hinder or obstruct it. This training is therefore in contrast to the simulation programs that favor the creation of educational spaces⁵ that support and facilitate the trainees' activity.

⁵ See section 2.2 below.

2.2 The four dimensions of a high-intensity simulation program

A rare training format: Immersion in extreme environments that call for “extraordinary” actions

Many studies have examined action in extreme environments: (i) rescue operations in hostile environments (Agresti 2012), (ii) hospital emergencies (Faraj & Xia 2006; Klein et al. 2006), (iii) firefighting (Gautier 2015; Weick 1993) and (iv) the flight maneuvers of aerobatic crews (Godé & Lebraty 2015). They have highlighted either the aversive characteristics of these environments (Hällgren et al. 2017; Hannah et al. 2009) or the need for “extraordinary” practices, such as the constant need to avoid potentially fatal errors (Bigley & Roberts 2001). Much of the research has been carried out in the military and police fields (Bechky & Okhuysen 2011; Catino & Patriotta 2013; Godé & Lebraty 2015; Melkonian & Picq 2010; Schakel et al. 2016) and has particularly underlined the extent to which action in these environments requires the capacity to preserve physical safety. However, little research has focused on training programs based on the principle of immersion in hostile environments.

Training for action in high-risk situations that expose trainees to continuous disruption

Preparedness training is based on an endogenous and positive conception of action in high-risk situations.⁶ This differs from an exogenous and negative vision, both in terms of the purpose of the action and the nature of the targeted learning.

When the endogenous vision of risk is promoted, as is the case here, the goal of the action is less to reduce the occurrence of a feared danger or to remove the trainees from risk by instituting

⁶ With reference to the positive/negative distinction of risk management made by Johnston and Paton 2001.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

preventive measures, and more to prepare them to be able to continue their leadership activities in the midst of disruptive or even dangerous environments.

From an exogenous and negative perspective on risk, the expected learning on how to maintain safety requires compliance with the rules (especially safety rules). This is part of a safety concept that Hollnagel called “Safety 1” (2014) and, as Flandin et al. (2017) reminded us, it is focused on the anticipation of accidents and foreseeable crises, leading to “the systematization of standards, rules and procedures and the minimization of the variability of operations” (Ibid., p. 3). However, from an endogenous and positive perspective on action in risky situations, safety depends on the trainees’ ability to preserve their capacities to act. This has led to a focus on learning that favors the taking into account of the individual and group resources that are likely to preserve individual capacities. The question thus is how trainees can become accustomed to acting in ordinary ways in environments that are extraordinary because of their aversive nature.

Training that breaks with the training programs that create protected environments

Preparedness training courses provide a contrast with the “protected training environments” (Bourgeois & Nizet 1997; Zeitler et al. 2017) that place emphasis on the quality of the environment and the relationship between trainees and trainers. The objective of preparedness simulations is to plunge the trainees into situations of incapacity embodied in experiences of inadequacy. This occurs by continuously confronting them with impossible situations arising from both the environment and the trainers’ actions. The repeated obstacles gradually deprive them of their physical, psychological and mental resources.

Training designed as a series of simulated situations

Although simulation often takes the form of “simulators” in the context of today’s technological advances, it would be simplistic to limit it to the use technological artifacts.⁷ Indeed, in the fields of both psychology (Piaget 1945; Wallon 1941) and professional training, we are reminded that simulations can take various forms of “acted-out situations” (Oget & Audran 2016), whether or not they mobilize material and symbolic artifacts. This is the case with the preparedness course, which is based on activities situated in a real environment (the natural environment) and the uninterrupted succession for 20 days of simulated situations, as described by Vidal-Gomel et al. (2011, p. 116) based on Samurçay (2005, p. 224).

In summary, we propose to describe this hybrid object as a “high-intensity simulation program” that immerses trainees in real conditions and confronts them for several uninterrupted days with an unfolding series of simulated situations. These simulations are not designed to protect the trainees from danger, nor to have them apply the prescribed norms. Instead, they are intended to train them to preserve their resources in brutal and hostile environments.

These characteristics give the training its unique character. They also offer a privileged view of what individuals experience as they learn to lead, even as they grapple with a risky environment that confronts them with the unknown, the unforeseen and the uncertain.

3. THEORETICAL FRAMEWORK AND RESEARCH QUESTION

3.1 From an enactive and semiotic conception of activity

⁷ Without of course denying the many possibilities, such as observing the unobservable or reconstructing critical situations, or being exposed without risk to dangerous situations, etc.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

From the perspective of a socio-constructivist and phenomenological epistemology (Varela et al. 1991), the present research examines what trainees experience during preparedness training by analyzing their activity within the theoretical framework of the course of action (Durand & Poizat 2015). We assume, in line with Horcik et al. (2014), that “training” can be understood using the methods of activity analysis. This analysis must therefore be conducted on the basis of a theory of activity that preserves the primacy of the learner’s point of view (Dieumegard et al. 2019). We thus chose to situate this research within the theoretical and methodological framework of the course of action, which draws on an enactive and semiotic conception of activity (Theureau 2003). Doing so allowed us to include three useful notions: disruption, experience and the semiotic dimension of activity.

The first notion is disruption because, as we have seen, one of the main characteristics of high-intensity simulation programs is the density and multiplicity of disruptive demands made on the trainees. These incessant disturbances continually interrupt the current activity of the officer cadets, throwing them into states of overexertion of their physical, psychological or mental capacities. In the course of action, these disturbances hold a preponderant place in the sense that activity here is conceived as an asymmetric coupling between an actor and his/her environment. Coupling refers to an actor’s moment by moment selection of what is likely to become a disruption so that an adequate response can be made (Theureau 2006).

The second notion is experience because the best way to understand how disruption is lived by trainees is by accessing their experience. Course-of-action theory offers a methodological framework for accounting for what actors experience moment to moment. Within this framework,

all activity is accompanied by lived experience that in part gives rise to conscious experience.⁸

This latter can be described as the degree of familiarity that the actor has with him/herself. Here, the trainees' flow of lived experience can thus be described from an intrinsic point of view based on the analysis of their typical concerns.

In order to make explicit how an actor's experience can be understood from the analysis of his/her typical engagements, we turned to the semiotic dimension of activity. This dimension is rooted in the conviction of Theureau (2009), who was himself much influenced by Peirce (1931–1958), that humans think and act through signs. In this conception of cognition, mental representations—that is, what an individual has in mind from moment to moment—are the dynamics of bringing an object to mind through a sign that takes the place of the object in question. Cognition is conceptualized here, not as relations between thoughts and facts, but as an interpretative movement emerging from the relations between the six components of the sign (called hexadic⁹). The semiotic framework of cognition thus postulates that access to the conscious part of an actor's lived experience can be acceptably described by the six components of the hexadic sign presented below.

The key role of concerns in the six components of the hexadic sign

1. (E): Engagement describes the horizons of the actor's possibles at instant (t). These emerge from both the actor-environment coupling and the state of the actor's body and culture. **They are expressed in the actor's discourse by the concerns and intentions that pervade the individual at instant (t).**
2. (A): The Potential Actuality is the multiplicity of the actor's anticipations and expectations given his/her concerns at instant (t).
3. (S): The Referential identifies the set of knowledge items that the actor can mobilize, given his/her concerns at instant (t).

⁸ This refers to what can be told, commented on and shown.

⁹ These have been described in the empirical and technological course-of-action research program (Theureau 2003).

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

4. (R): The Representamen is what disturbs the actor at a given instant, thus what effectively makes a sign for him/her. This may take the form of perceptions (sensory), proprioceptive sensations, or what is recalled in memory at instant (t).
5. (U): The Unit of the Course of Experience identifies what the actor does, says, thinks and feels at instant (t).
6. (I): The Interpretant, as the operator of the actor's situated transformation of knowledge, contributes to the emergence and the validation or invalidation of the actor's knowledge.

In summary, the theoretical framework for the course of action and enaction provides insight into what trainees are experiencing from the analysis of their concerns, even when they are engaged in high-intensity simulated situations and are constantly being disturbed by incessant demands.

3.2 The problem and the research objective: To assess how officer cadets experience their ability to maintain the resources of individuals in a high-intensity simulated training situation

How do you learn to persevere in action when everything is against it?

The studies that have analyzed activity in dynamic and dangerous environments¹⁰ (Hällgren et al. 2017; Hoc et al. 2004; Rogalski & Samurçay 1993) have not only described these environments as generators of uncertainty, ambiguity, confusion and instability, but they have also shown the extent to which these environments pose a multitude of problems by impeding the participants' capacity to act. Among these problems are: (i) difficulties in perception, understanding and drawing inferences, which complicate decision-making; (ii) the deterioration in modes of both cognitive and operational coordination, which makes cooperation less efficient; and (iii) the impact of the tensions created by the continuous re-evaluation of their preconceived expectations even as

¹⁰ Please recall that danger is defined as “the intrinsic capacity of an activity, substance, technology or situation to harm the integrity of people, property or the environment” (Chauvin 2014, p. 16).

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

they find themselves facing contradictory demands. They thus need to be able to step back from regulatory activities while simultaneously engaging in the immediate and rapid execution of the actions required by an emergency. Last, it should be recalled that when danger becomes real with an injury, this breach of the individual's physical integrity decreases or even neutralizes their individual resources.

In short, in risky environments, individuals are immersed in an intensive experience that “overtaxes” their physical, psychological or mental capacities. In these environments, they therefore face a double problem. First, even though they are immersed in an environment where everything distracts, interrupts, and diverts them from what they have to do, they must still ensure that their overriding action remains focused on successfully completing their mission. Yet they must also find ways to preserve both the individual and group resources that are necessary for this.

How do you train for the unforeseen, the unexpected, the uncertain—that is, how do you prepare someone not to be ready?

Preparing future officers to lead in uncertain situations means having a curriculum designed to develop the capacity for discernment, decision-making and action in dynamic and dangerous environments that generate ambiguity, confusion, instability and stress. Yet these environments (i) make both cognitive and operational coordination difficult (Caroly & Barcellini 2013); (ii) call into question preconceived anticipation strategies; (iii) force actors to continuously reassess their understanding of the situation; and (iv) create difficulties of perception, comprehension and inference (Melkonian & Picq 2010; Rogalski & Samurçay 1993).

Training professionals to know how to act in unknown, unforeseen, uncertain or even unsustainable environments is therefore a major challenge for the designers of these programs:

How do they prepare trainees for what cannot be imagined in advance and what will always remain in part unimaginable (Dechy et al. 2016)?¹¹ The challenge here is to train them to think and act “outside the box,” as Samurçay and Rogalski (1998) have long emphasized. As learners, they first need to know how to recognize novel situations. However, as Flandin, Poizat and Durand (2018) have shown, this capacity to recognize novelty cannot be acquired only from the analytical and conceptual reasoning learned in sessions based on the appropriation of formalized knowledge.

In short, when training courses must prepare individuals to act in dynamic, risky and multi-outcome environments in which they have to handle often contradictory concerns and face situations as new as they are disturbing, it may be better to imagine design principles other than those traditionally used to prepare individuals for known, relatively stable and secure environments.

Dual-purpose research

In summary, the objective of this research was twofold: (i) to describe how officer cadets experience their ability to maintain the resources of individuals in a high-intensity simulated training situation, and (ii) to propose principles that may guide the future design of such training programs.

3.3 The research question: In a high-intensity simulated training situation, around which typical concerns do trainees organize their engagement as they learn to lead?

¹¹ Question in response to which the author invites us to investigate practices aimed at “learning to act differently so as not to be surprised” (p. 8).

To understand how officer cadets experience their ability to maintain the resources necessary for the action of those under their command, we mobilized the forms of engagement as the theoretical object because they describe the nature of the typical concerns driving the trainees as they learn. According to course-of-action theory (Theureau 2003), engagements emerge from the set of an actor's concerns and intentional states at instant (t). In the case of training, they reflect what the trainees are trying to do, not only moment to moment, but also throughout the course of their experience. These engagements take a typical form, and they function as anchors for past, present and future situations. Two main forms of engagement are usually distinguished: an exploratory mode and an executory mode (Sève & Leblanc 2003). When the engagement is exploratory, the actors focus on understanding the situation and seek relevant information. When it is executory, they focus on effectiveness and the modes of execution for what they are doing. In other words, they do “what works” and avoid “what does not work” (Durand et al. 2006). But what happens in environments where activity is systematically impeded? Do we find these two modes operating here? Are they the only observable forms of engagement?

4. METHODOLOGY

4.1 The field and the population

Following this description of the characteristics of the CEFÉ preparedness training course for the EMIA¹² officer cadets, we now provide details on the trainees. The study population was made up of a brigade from the *École Militaire Interarmes de Saint-Cyr Coëtquidan*, comprising about a

¹² *L'École Militaire Interarmes.*

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

hundred students. These young professionals have had initial professional experience in regiments, police stations or fire stations. The brigade was made up mainly of men as women represent only 10% of the workforce in these professions.

4.2 Methodological approach

4.2.1 Access to the field: A long phase of immersion and acculturation

Data collection was preceded by an 18-month ethnographic immersion phase (De Sardan 1995). The purpose was to become familiar with the professional environment and build the conditions for cooperation between the military students and the researcher, an essential requirement of the course-of-action observatory (Durand 2008).

4.2.2 Data collection and processing: Identifying the trainees' typical concerns

The second phase of observing the cadet training activity was divided between the *École de Saint-Cyr Coëtquidan* (2 weeks) and the CEFE (3 weeks). Data were collected in the form of video traces, activity traces and interviews. In the third phase, this material was processed by retrospective verbalization during 35 self-confrontation interviews (Theureau 2010). The detailed construction of the data focused on six cases selected for their rich content, offering nearly two hours of observation of trainees in action and five and a half hours of self-confrontation interviews. The processing was organized in three stages: (i) preparation of the data protocol using two-part tables comparing the trainees' behaviors and communications in action and their comments during the self-confrontation interviews; (ii) minute by minute decomposition of the conscious part of their lived experience through the six components (E, A, S, R, U, I),¹³ which enabled a fine-grained

¹³ See the insert: The key role of concerns in the six components of the hexadic sign.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

documentation of their concerns as reflected by their engagements (E); and (iii) classification of the 36 typical concerns according to the mode of engagement.

5. RESULTS AND GENERALIZATIONS

5.1 In addition to the traditional exploratory and executory dimensions of activity, a third dimension of actor engagement emerges: Conservatory

The modes of engagement were examined by reclassifying the types of concern according to whether they were oriented toward seeking information (exploratory) or executing tasks, either in progress or upcoming (executory). We identified nearly 42% of the engagements that did not fit into either of these two categories and thus inductively derived a third type of engagement that we termed conservatory. Indeed, in situations in which it manifested, this type of engagement was less related to information-seeking or action as it was to preserving the conditions necessary for the exploratory or executory modes of activity.

From a quantitative point of view, it is interesting to note that among these three forms of engagement, two were equally and predominantly present: executory and conservatory, with each representing 41.7% of the typical concerns (Figure 5.1).

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

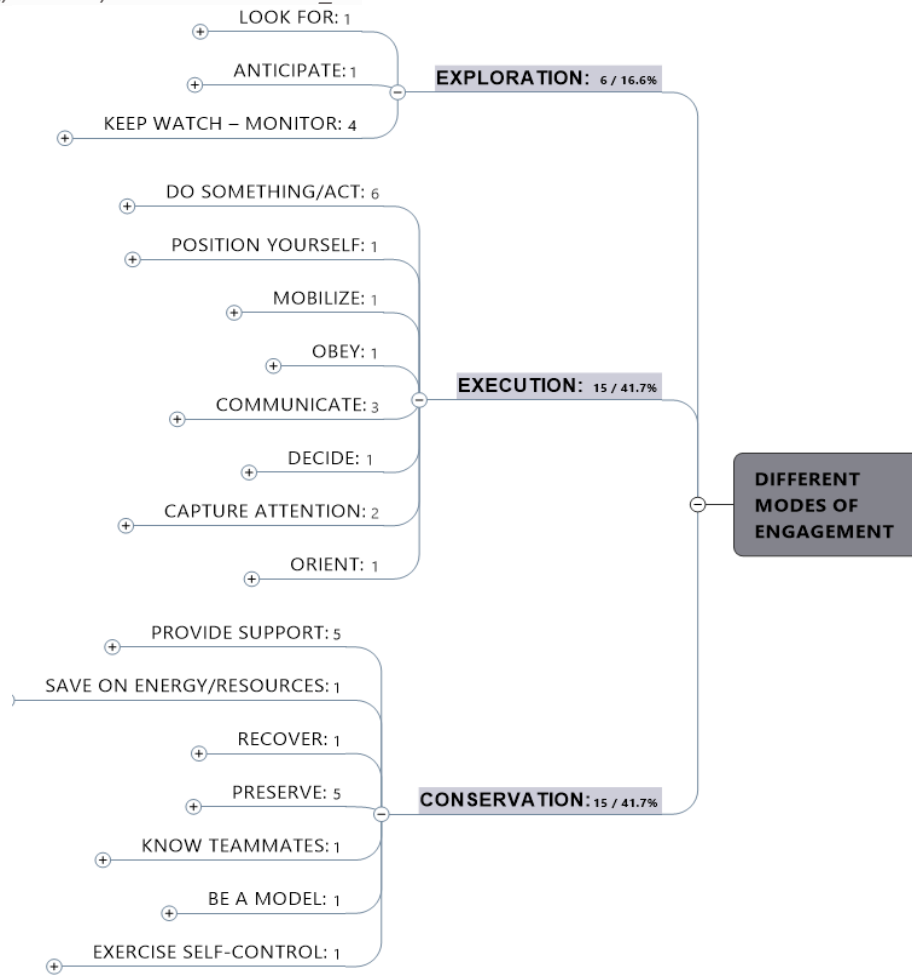


Figure 5.1. The distribution in percentage of the three modes of engagement

A more detailed analysis (Figure 5.2) of the intentions that structured the trainees’ actions in these risky environments provided elements of response to our research question. Indeed, what concerned the officer cadets as they sought to preserve the conditions for immediate and future action was the need to conserve the physical and psychological, and both individual and collective, capacities of those under their command.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

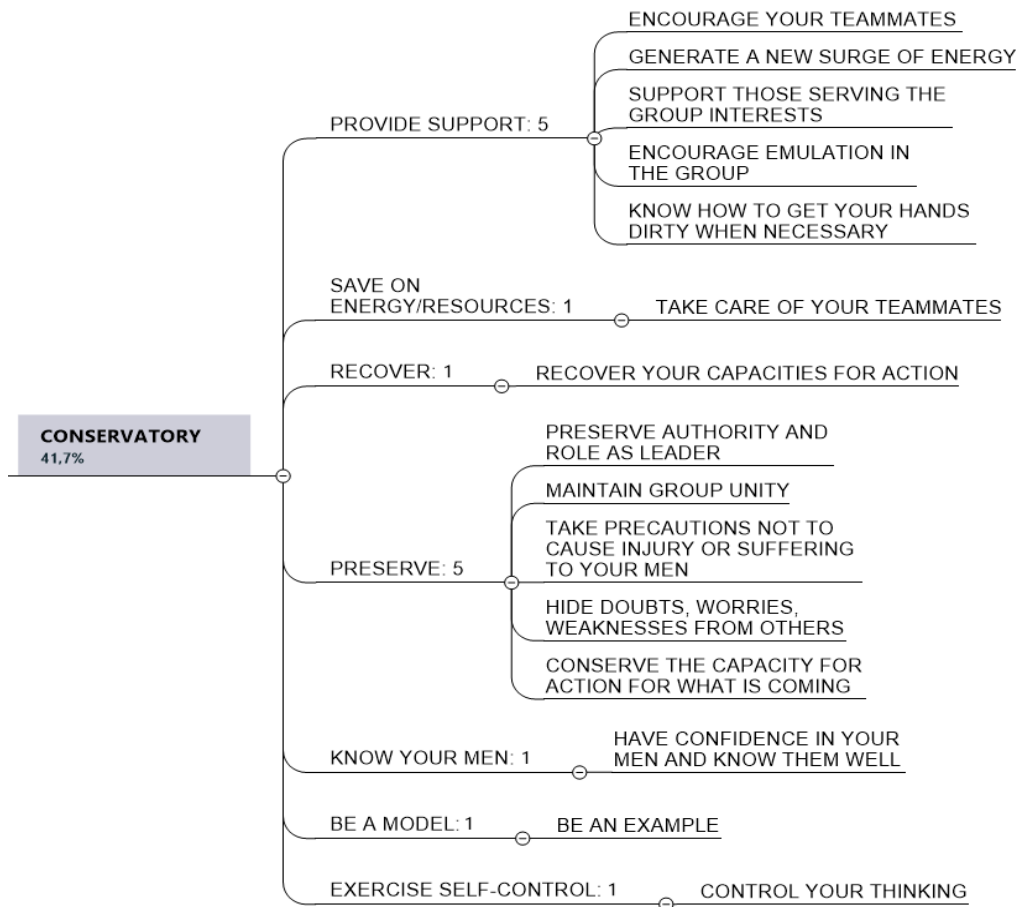


Figure 5.2. The typical concerns as matters for conservatory engagement

Last, by looking even more closely at this emblematic concern of conservatory engagement, namely the typical concern to “take care of your men” we observed more clearly how the officer cadets tried to maintain each individual under their command operating at full capacity. Figure 5.3 below shows that this consisted of: (i) organizing work handovers, (ii) avoiding hyper-stress, (iii) organizing rotations on demanding “posts” (iv) not leaving individuals alone, (v) ensuring enough recovery time, (vi) listening for signs of pain and stepping in to help, (vii) focusing energies on the main action, (viii) shortening the time spent coping with too many demands at once, and (ix) distributing out the missions.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

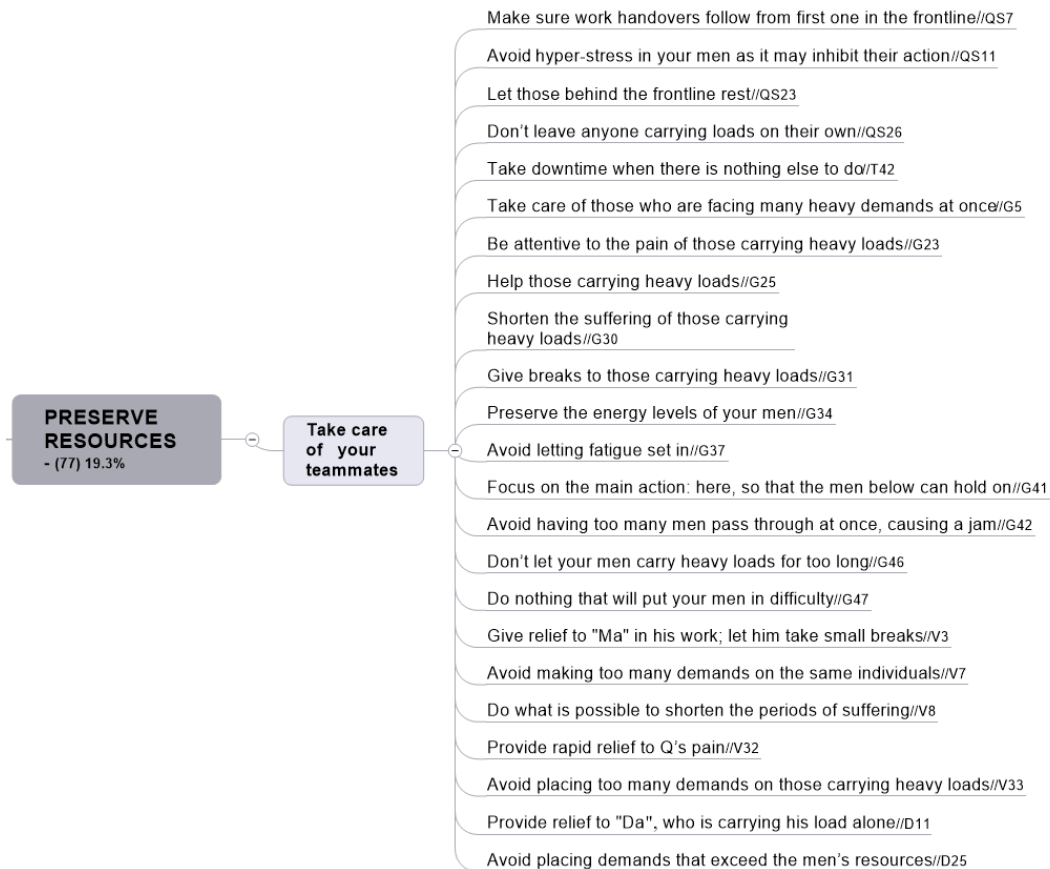


Figure 5.3. The concerns as part of the typical concern of “take care of your men”

Summary

These results show that during this immersion in a risky environment, the trainees discovered and learned that leading means to a great extent transforming the way they mobilize both their capacities and those of the individuals they are responsible for. Their immersive experience thus shifted from a mode primarily focused on doing what needed to be done to one primarily dedicated to maintaining and preserving the resources and capacities needed to continue doing what needed to be done. Thus, it appeared that an essential dimension of commanding required the deployment of intense conservatory activity.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

5.3 Six design principles for simulated training programs to prepare civil protection professionals to know how to act in unknown, unforeseeable, uncertain and even unbearable situations

In addition to providing a more detailed understanding of how individuals immersed in risky environments manage to sustain their action, the results of this research are notable for their focus on fields of professional activity beyond the military world. The common denominator of these professions is the imperative of preserving the continuity of professional action even though the individuals are coping with multiple hindrances to their action and thus must figure out how to act at the limits of the known, the expected, the certain and even the tenable. Among these fields is of course civil protection, but the management field might be included as well, as under the pressure of management systems aimed at maximizing control and performance, this field has seen managerial practice transformed from the “governance of people” to the “administration of things” (Boussard 2008).

As our sample was made up of future officers in the military, firefighting and policework, our results can be applied to these professions of civil defense and protection, though future research might expand the scope of applicability. We therefore propose six principles for enhancing learning potential through the design of training programs that prepare individuals to know how to act in the face of the unknown, the uncertain, and the unforeseen.

5.3.1 Design high-intensity simulated training programs that disrupt the trainees

Prompted by the reflection initiated by Schot et al. (2019) on events-driven adult training, we propose here a form of “high-intensity” simulated training. Let us recall the four main criteria for specifying its nature.

First, these training programs immerse individuals in environments that place great demands on them. Two dimensions are important here: immersion and environments that are aggressive for one's physical integrity. The first dimension is operationalized by the training duration, which covers several days that are long and therefore fatiguing. The second is due to the intrinsic characteristics of the training environment (here: high heat and humidity compounded by the density and dangerousness of the surrounding fauna and flora), which differs greatly from the one that the trainees are physically accustomed to. As a result, the activities carried out in this environment tend to deprive the trainees of their capacities.

Next, as these programs are based on a positive conception of risk (Johnston & Paton 2001), they are not designed to protect the trainees from the occurrence of the feared risks but are instead oriented toward training them to know how to preserve their capacities to act while in the middle of these threatening environments. In this case, individuals are trained to know how to cope with an overwhelming experience rather than avoiding it.

In addition, these programs are designed as a seemingly endless series of simulated situations that leave trainees in the dark about the program design. Finding themselves in this situation teaches them to modulate their level of investment in the exercises in such a way that they are constantly engaged in preserving the resources that will be necessary for them to continue to act.

Last, another factor that contributes to the high intensity of these simulated training programs is the endless barrage of disturbances that become so many potential obstacles to action. Gorman et al. (2010) showed that when these disturbances are introduced into trainees' learning dynamics, they promote the adaptive processes that are crucial for action in uncertain and dynamic environments.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

5.3.2 Give preference to events-based training courses that simulate situations of real testing

When professionals are being prepared for situations that are unthinkable because they are unpredictable, the training curricula designed on the basis of predefined knowledge have limited effectiveness, as noted by Flandin, Poizat and Durand (2018). The results of our research were similar to their results and illustrate the benefits of simulated training programs based on the occurrence of events that test the trainees to their limits.

Two notions are central here: the *event* and the *ordeal*.

An *event* breaks with the usual phenomena of everyday life. It disrupts the usual anticipatory processes, generating surprise and even astonishment. In this sense, an event is a resource for training as it is conducive to immersing learners in new situations. Zarifian (1995) distinguished two forms of event. The first is random and unexpected (an *aléas* event). The second is expected but its occurrence and modalities remain uncertain (a *rendezvous* event). Although a key element of programs for preparedness training is the randomness of events, this does not preclude the introduction of *rendezvous* events in future programs or a combination of the two.

As Baudoin reminded us (2014, p. 225), an ordeal refers to “a certain number of decisive or critical moments in personal history that are salient, transitional, and life-changing.” The examination of how these officer cadets were tested revealed three phenomena that might be mobilized in other training courses: (i) the discovery of personal limits, (ii) a situated assessment that allowed them to test themselves, and (iii) the embodied experience of what their own bodies were able to teach them about themselves and their environment. The trainees’ ordeal was thus simultaneously:

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

- What the ordeal is; that is, what makes it a painful experience. This is the space of sanction, not in the sense of punishment, but as the discovery of personal limits and the ontological finitude of any individual as a vulnerable being.¹⁴

- Yet it is also what has caused it to be an ordeal. This refers to the personal evaluations that allow the trainees to test themselves. The ordeal thus has a revealing role because through it the trainees discover and assess the supports (artifacts or social) and resources (personal or social) that they possess or can manage to mobilize.

- Last, the ordeal is what the trainees experience as a place of the corporeality¹⁵ of the activity; that is, the place of experience inscribed in the body that has both a physical and a lived structure.

5.3.3 Combine the design of spaces for action that are both encouraged and prevented

In the chapter of this book titled “Four lines of analysis for civil security crisis simulations: insights for training design,” Flandin underlines the importance of disturbance in training because, among other things, disturbance makes it possible for trainees to test “the robustness of their modalities of interpretation, action and collective configuration....”

However, using disturbances as a teaching method is a delicate operation. Both designers and trainers must regulate a complicated mix of adjustments. Indeed, disturbances must generate enough surprise to shake the learners up and trigger new elaborations of meaning in order to shed light on the novelty of the situations. But at the same time, they must not destabilize the trainees

¹⁴ As much for biological reasons as for dependence on the social environment. See Le Blanc (2011) and Maillard (2011).

¹⁵ That is, the set of interconnections of sensory, sensorimotor and cognitive dimensions.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

to the point of generating forms of disengagement from the educational activity underway or of neutralizing their capacities.

Thus, to preserve the mediating character of training situations and promote transfers on the part of learners, preparedness training teaches us that educational programs are called on to be both “spaces of encouraged action (Reed & Bril 1996; Durand 2008) and spaces of impeded action.” “Encouraged” refers to the sense that they generate a feeling of ontological security in the trainees, which is expressed among other ways by the conviction that the trainers want what is “good” for them and their success. “Impeded” refers to the sense that the ordeal as described above offers them a potential to learn that generates the conservatory modes of engagement described in our results.

5.3.4 Encourage the development of modes of contextual engagement and operational engagement

The analysis of the officer cadets’ modes of engagement in “learning to lead” revealed an unexpected mode: conservatory. Let us recall its characteristics: when this mode is actualized, the trainees do not seek so much to execute an action or to seek information for doing so or to control what is being executed. Instead, they are engaged in preserving the favorable conditions for doing what needs to be done, for seeking information about doing what needs to be done, or for monitoring what was done or is being done. In this sense, we describe this mode of engagement as contextual to distinguish it from the exploratory and executory modes that are described here as operational.

Contextual modes of engagement like the conservatory mode¹⁶ contribute to creating, maintaining or developing the conditions that enable the trainees to carry out the tasks directly related to the productive part of the activity: in this case, carrying out the mission.

In these contextual modes, we see a competence for discrimination in risky environments: knowing how to preserve and maintain the conditions for task execution.

5.3.5 Seek skill acquisition rather than knowledge or know-how

As we noted above,¹⁷ training programs to prepare for action in unknown (and therefore unthinkable) situations cannot be designed on the basis of predefined knowledge. This does not mean that no knowledge is to be acquired, but rather that critical learning here is related to the development of dispositions to act in certain ways in certain circumstances (Muller et al. 2014). Indeed, this research shows that trainees, by jointly developing exploratory and conservatory modes of engagement, are mainly called upon to transform their ways of being, acting and interacting with themselves and their peers; in other words, to transform their dispositions to act and interact in these two modes.

5.3.6 Focus on developing transformative dispositions to act as a way of being in the world

The distinction between doing and preserving the conditions for doing may seem simple, but from a learning perspective it is not because it refers to two forms of relation to reality:

In the first, trainees focus on learning the pertinence of the decisions, actions, or gestures to be made. In the second, the concerns revolve around the relationship that they have with what they are doing and what is being done. In other words, in this second case, they need to acquire another

¹⁶ We assume that other studies will uncover other forms of contextual engagement.

¹⁷ See section 5.3.2.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

form of relation to reality in which their capacities are as much in the service of what is happening (in and around them) as they are in the service of what is to be done. It is about being open to or available to what is and what is coming.

Indeed, what unfolds between these two relations to reality is a shift between two ways of being in the world is: the trainees shift between an actively active posture and a passively active posture. In the second form of relation, the challenge for the trainees is learning how to be present and attentive to the relation they have with the phenomena within and around them. The first involves learning to do what is necessary to meet the demands of the task and the situation.

However, learning to be available to what is happening calls for a form of passivity and thus may at first glance be perceived as unnatural by those trainees who think (and rightly so, in part) that in risky environments they must be hyperactive to cope with the multiplicity of demands they are facing.

So here we have a double educational challenge. The first consists of ensuring that learners acquire a way of being passively active even though nearly everything in their environment is pushing them to an activity oriented toward “doing” and not toward “being available to what is being done.”

The second challenge is to identify the pedagogical processes capable of supporting the trainees in knowing how to execute an action, but in such a way that these two modes are harmoniously coordinated in the action. This is vital, because obviously the goal is not for them to pass alternately from one mode to the other, but to be in the world through the two jointly.

6. SYNTHESIS AND PERSPECTIVE

The objective of this research was twofold: (i) to describe how officer cadets experience their ability to maintain the resources of everyone involved in a situation of high-intensity simulated training, and (ii) to derive principles that can guide the future design of these training programs.

The findings on “learning to lead” in a simulated high-intensity training situation showed that the officer cadets experienced their ability to maintain the resources of others through a counterintuitive process: the conservatory mode of engagement. They showed the same levels of executory and conservatory engagement in that they were equally intent on action and on preserving those conditions conducive to sustaining their own capacities and those of the individuals under their command. They also sought to preserve both individual and group capacities in physical, psychological and mental dimensions. The study further suggested six principles for the design of simulated training programs dedicated to civil protection professionals learning to know how to act when they find themselves in unknown, unforeseeable, uncertain and even unbearable circumstances. The principles are based on the intensive testing of the trainees in spaces for action that jointly encouraged and prevented their action and that favored the development of contextual modes of engagement and a transformation in their way of being in the world.

We would now like to emphasize a learning potential offered by this program that was somewhat left aside in this article. Our study, however, suggests that it was an important, if not the major, part of what the officer cadets experienced as they worked to maintain the resources of the individuals under their command: This was the transformation in the nature of their attention which, little by little, shifted from an attention “focused on” to an “attentiveness” to the presence of oneself and others.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

To clarify what we mean, we must recall that the trainees' third¹⁸ typical concern was to “capture and orient the cognitive capacities of their men” and call upon the work of Depraz et al. (2011) on a phenomenological reduction summarized as the suspension of judgment, which is described by a double movement of attentional conversion and receptiveness/letting go. We here hypothesize that the double movement—by which the cadets were constantly alert to the micro indices that informed them about the state of their bodies and those of their men (the mode of conservatory engagement) and were also able to capture their men's attention (to ensure the effectiveness of their command)—contributed to the process of attentional conversion described by these authors. The repetition of this mechanism seemed to lead to an experience that the trainees described as a widening of their field of consciousness, which we believe is an appropriate way to describe the transformation in their mode of attention. What took place when the officer cadets “let go” was an opening to what could emerge at any moment in their bodies, minds, or situations. They thus shifted from a conquering attitude directed by an outward-looking intentionality (objects of attention) to a posture of availability to whatever might happen, as it happens.

Finally, let us note that when this very particular disposition was shared by several members of the group, it then became what Depraz (2017, p. 399) called “being attentionally together.” This then allowed the officer cadets to deploy a new form of coordination, dispositional, so called because it was based not so much on cognitive or operational coordination but on a new way of being together, with all attentive to what is happening within them, between them and around them.

¹⁸ In terms of frequency of occurrence.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

In short, what initially appeared to be obstacles to the activity of the officer cadets (the multiple demands disrupting the courses of their experience) turned out to be learning factors capable of balancing their activity between executory and conservatory engagements and converting their attention toward an activity of vigilance for oneself and others.

References

- Amalberti, R. (2001). La maîtrise des situations dynamiques. *Psychologie Française*, 46(2), 107-118.
- Armée de Terre. (2017). *Politique pour l'aguerrissement au combat de l'Armée de Terre*. Ministère de la Défense.
- Bechky, B. A., & Okhuysen, G. A. (2011). Expecting the unexpected? How swat officers and film teams handle surprises. *Academy of Management Journal*, 2(54), 239-261.
- Bigley, G. A., & Roberts, K. H. (2001). The Incident Command System: High-Reliability Organizing for Complex and Volatile Task Environments. *The Academy of Management Journal*, 44(6), 1281-1299.
- Bion, W. R. (1991). *A Memoir of the Future*. Routledge.
- Baudouin, J.-M. (2014). La « Phrase qui tue » La notion d'épreuve, de la dissémination à la conceptualisation. In J. Friedrich & J.-C. Pita Castro, *Recherches en formation des adultes. Un dialogue entre concepts et réalité* (p. 223-253). Raison et Passions.
- Dieumegard, G., Nogry, S., Ollagnier-Beldame, M., & Perrin, N. (2019). Lived experience as a unit of analysis for the study of learning. *Learning, Culture and Social Interaction*, 100345.
- Bourgeois, E., & Nizet, J. (1997). *Apprentissage et formation des adultes*. PUF.
- Boussard, V. (2008). *Sociologie de la gestion : Les faiseurs de performance*. Belin.
- Caroly, S., & Barcellini, F. (2013). *Le développement de l'activité collective*. PUF.
- Catino, M., & Patriotta, G. (2013). Learning from errors : Cognition, emotions and safety culture in the Italian Air Force. *Organization Studies*, 34(4), 437-467.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

- Dechy, N., Mortureux, Y., Planchette, G., Blatter, C., & Raffoux, J.-F. (2016). Explorer « l'imprévisible » : Comment et jusqu'où ? *Maîtriser les risques dans un monde en mouvement*. 20ième congrès de Maîtrise des Risques et de Sûreté de Fonctionnement, Saint-Malo.
- Depraz, N., Varela, F. J., & Vermersch, P. (2011). *À l'épreuve de l'expérience : Pour une pratique phénoménologique*. Zeta Books.
- Durand, M. (2008). Un programme de recherche technologique en formation des adultes. Une approche éactive de l'activité humaine et l'accompagnement de son apprentissage/développement. *Éducation et didactique*, 2(3), 97-121.
- Durand, Marc, Saury, J., & Sève, C. (2006). Apprentissage et configuration d'activité : Une dynamique ouverte des rapports sujets-environnements. In J.-M. Barbier & M. Durand, *Sujets, activités, environnements* (p. 61-83). Presses Universitaires de France.
- Durand, M., & Poizat, G. (2015). An activity-centred approach to work analysis and the design of vocational training situations. In L. Filliettaz, & S. Billett (Eds.), *Francophone perspectives of learning through work* (pp. 221-224). London: Springer.
- Flandin, S., Poizat, G., & Durand, M. (2018). Improving resilience in high-risk organizations: principles for the design of innovative training situations. *Development and Learning in Organizations: An International Journal*, 32, 9-12
- Gorman, J. C., Cooke, N. J., & Amazeen, P. G. (2010). Training Adaptive Teams. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 52(2), 295-307.
- Hällgren, M., Rouleau, L., & de Rond, M. (2017). A Matter of Life or Death : How Extreme Context Research Matters for Management and Organization Studies. *Academy of Management Annals*, 12(1), 111-153.
- Hannah, S. T., Uhl-Bien, M., Avolio, B. J., & Cavarretta, F. L. (2009). A framework for examining leadership in extreme contexts. *Leadership Quarterly*, 20(6), 897-919.
- Hoc, J.-M., Amalberti, R., Cellier, J.-M., & Grosjean, V. (2004). Chapitre 2. Adaptation et gestion des risques en situation dynamique. In J.-M. Hoc & F. Darses, *Psychologie ergonomique: Tendances actuelles* (p. 15-48). PUF.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

- Horcik, Z., Savoldelli, G., Poizat, G., & Durand, M. (2014). A Phenomenological Approach to Novice Nurse Anesthetists' Experience During Simulation-Based Training Sessions: *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*, 9(2), 94-101.
- Johnston, D., & Paton, D. (2001). Disasters and communities : Vulnerability, resilience and preparedness. *Disaster Prevention and Management: An International Journal*, 10(4), 270-277.
- Melkonian, T., & Picq, T. (2010). Opening the « Black Box » of Collective Competence in Extreme Projects : Lessons from the French Special Forces. *Project Management Journal*, 3(41), 79-90.
- Muller, A., & Plazaola Giger, I. (2014). *Dispositions à agir, travail et formation*. Octarès Editions, DL 2014.
- Oget, D., & Audran, J. (2016). Autour des mots de la formation : « Simulation ». *Recherche & formation*, 82, 75-84.
- Piaget, J. (1945). *La formation du symbole chez l'enfant : Imitation, jeu et rêve, image et représentation*. Lonay, Delachaux & Niestle.
- Reed, E. S., & Bril, B. (1996). The primacy of action in development. In M. Latash & M. Turvey, *Dexterity and its Development* (p. 431-451). Hillsdale, NJ: Erlbaum Associates.
- Rogalski, J., & Samurçay, R. (1993). Représentations de référence : Outils pour les contrôle d'environnements dynamiques. In A. Weill-Fassina, P. Rabardel, & D. Dubois, *Représentations pour l'action*. Octares éd.
- Samurçay, R. (2005). Concevoir des situations simulées pour la formation professionnelle : Une approche didactique. In P. Pastré, *Apprendre par la simulation - De l'analyse du travail aux apprentissages professionnels* (p. 221-239). Octares Editions.
- Samurçay, R., & Rogalski, J. (1998). Exploitation didactique des situations de simulation. *Le Travail humain*, 4(61), 333-339.
- Samurçay, R., & Rabardel, P. (2004). Modèles pour l'analyse de l'activité et des compétences, propositions. In Renan Samurçay & P. Pastré (Éd.), *Recherches en didactique professionnelle* (p. 163-180). Octarès.
- Schakel, J.-K., van Fenema, P. C., & Faraj, S. (2016). Shots Fired! Switching Between Practices in Police Work. *Organization Science*, 27(2), 391-410.

This is a post-print of the following chapter: De Bisschop, H., Leblanc, How do simulated high-intensity situations train leaders to maintain their ability to act in unfamiliar, unforeseen or uncertain environments?, edited by Simon Flandin, Christine Vidal-Gomel, and Raquel Becerril Ortega, 2022, Springer International Publishing, reproduced with permission of Springer Nature Switzerland AG. The final authenticated version is available online at: https://doi.org/10.1007/978-3-030-89567-9_12

- Schot, S., Flandin, S., Goudeaux, A., Seferdjeli, L., & Poizat, G. (2019). Formation basée sur la perturbation : Preuve de concept par la conception et le test d'un environnement numérique de formation en radiologie médicale. *Activites, 16-2*.
- Sève, C., & Leblanc, S. (2003). Exploration et exécution en situation : Singularité des actions, construction de types et apprentissage dans deux contextes différents. *Recherche & formation, 42*(1), 63-74.
- Theureau, J. (2003) Course of Action Analysis & Course of Action Centered Design. In: Hollnagel, E. (ed.) Handbook of Cognitive Task Design, pp. 55–81. Mahwah NJ: Lawrence Erlbaum Ass.
- Vidal-Gomel, C., Fauquet-Alekhine, P., & Guibert, S. (2011). Réflexions et apports théoriques sur la pratique des formateurs et de la simulation. In P. Fauquet-Alekhine & N. Pehuet, *Améliorer la pratique professionnelle par la simulation* (p. 115-141). Octares Editions.
- Wallon, H. (1941). *L'évolution psychologique de l'enfant*. A. Colin.
- Walter, A. (2015). Le combat en forêt équatoriale. In D. Danet, R. Doaré, & C. Malis, *L'action militaire terrestre de A....à....Z* (p. 210-217). Economica.
- Williams, M. H. (2018). *The Aesthetic Development : The Poetic Spirit of Psychoanalysis : Essays on Bion, Meltzer, Keats, 1st Edition (e-Book)*—Routledge.