

The Dynamics of Clausewitzian Friction

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ABSTRACT: Under de senaste åren har begreppet friktion vunnit mycket popularitet bland både forskare och utövare av militärt tänkande och krigsteorier. Den rådande diskussionen har till exempel fokuserat sig på dess aktuella relevans. Clausewitz's skrifter om friktion har använts för att beskriva slagfältets natur som oväntat, icke-definierbart och kaotiskt, istället för att vara ett förutsägbart och metodiskt fenomen. Inom den vetenskapliga diskussionen har Clausewitz's koncept dock övervägande tillämpats, men inte utforskats. Paradoxalt nog har friktion ratificerats som en av de inflytelserika delarna av krig, men de frågor som rör den faktiska karaktären och dynamiken av friktion, har lämnats oadresserade. Denna artikel, som bygger på Clausewitz's syn på friktion, föreslår en teori om dynamiken i friktion. Fenomenet i sig är baserat på människor – i motsats till att det uteslutande bestäms av en slump – och därmed är dess uppkomst forskningsbar. I den här artikeln utnyttjas den senaste forskningen för att nå ökad förståelse av fenomenet friktion.

FRICION, A CONCEPT developed by Carl von Clausewitz (1780–1831),¹ is a theoretical concept much used, but, at the same time, largely misrepresented within war studies. Especially in recent years, the concept has become popular among both scholars and military organizations. Even more important is the fact that various interpretations of the concept have found their way into official regulations and doctrines, such as the joint US doctrine vision 2020² and the U.S. Army Field Manual 3-0 Operations (2008). Also the Swedish *Militärstrategisk doktrin* (2002) includes the same concept.³

It is no wonder that the concept of friction has recently gained prominence. The events in Afghanistan and Iraq have indicated that the role of combat leaders of lower rank has become more significant. In essence, they are nowadays performing the role in the battlefield previously considered the responsibility of senior commanders. At the same time, the battles have moved to jungles, mountains and cities, i.e.

to complex terrains, where the role of individual soldiers as well as lower-rank leaders is more significant than it would have been during the phases of major battle operations.⁴ The irregular threats with the use of unconventional and asymmetric methods in Afghanistan and Iraq have also convinced the U.S. military that “chaos, chance and friction dominate land operations as much today as when Clausewitz wrote about them after the Napoleonic wars”.⁵

Systematic argumentation has been presented, asserting that no technological advancement can eliminate the effects of friction as long as chance continues to be a factor in warfare, and as long as war continues to be a human-in-the-loop process.⁶ Although it may seem as a truism for us today, opinions concerning friction were completely different not very long ago. In fact, friction was not seen to be an essential factor in modern war, since it was believed that the battles could be controllable by the means of command and control. The U. S. Army prepared for

a different kind of warfare still during the 1990's. In the FM 100-5 (1993), the importance of friction was considered only as a claim for the commanders to read the battlefield continually, and to know when to decide and act without hesitation in order to reduce friction.⁷ The recent change in attitudes towards friction can be seen in FM 3-0 (2008), where the human-focused approach is itemized. For example, land operations are understood as being inherently tied to the human dimension, which is why, according to the manual, they cannot be reduced to a simple formula or checklist.⁸ In this manual, the theme of friction has so many different purposes and meanings that the reader is left confused. Firstly, the manual suggests that friction takes place when different cultures meet. Consequently, it is proposed that overcoming friction may reduce mistrust and the clashes between cultures. Secondly, friction is claimed, as a self-evident fact, to be inherent in all operations, implying that – inevitably – things can and will go wrong as the friction and the fog (of war) are always present. Thirdly, it is argued that by means of careful planning and with continuous coordination, one might moderate the effects of friction.⁹ These interpretations and practical examples demonstrate the slack use of the concept, which may be seen to prevail in the discussions on friction more generally.¹⁰ The concept appears to be accepted as received wisdom, to the extent that it no longer is seen to require justifications or further examination.

To some extent, the ambiguity in the usage of the concept of friction may be seen to stem from Clausewitz's own reference to friction being extremely difficult to capture.¹¹ In the scholarly discussion, this seems to be taken too literally, and, most of all, taken for granted. In consequence, it has been taken to implicitly justify that there is

no need for further research on the phenomenon either. From this perspective, it is no wonder that the concept of friction has become such a collector of manifold phenomena, which may be used with reference to any event that one cannot explain. However, we should bear in mind that while friction, as a phenomenon, may be of a kind that does not disappear in time, the possibilities for researching it may have changed during the past 200 years. In other words, although Clausewitz stated that friction may not be handled as an abstraction, we should, as an act of academic thoroughness, consider this argument critically, i.e. whether there are better possibilities for examining the nature of this phenomenon today.

In this article, we aim precisely to consider and theorize the dynamics of friction: first we will analyze Clausewitz's view on friction with philosophical methods. Second, we will develop further the essential elements appearing in the analyses in the light of contemporary research. The result of this research is a new perspective on the concept of friction that explicates the nature of friction, and offers a theorization of its dynamics. However, before going into the theoretical analysis of Clausewitz's concept, in the following, we will briefly consider the context for the development of this notion in the first place.

The origins of Clausewitz's concept of friction

Clausewitz did not make theories of war without understanding what he was studying. He was well aware of the conduct of war in his own era. He was able to explicate the nature of warfare precisely because his own experience of war was so intense but also traumatic. During the Napoleonic Wars, he

was too young to make a significant contribution as a military leader. Nevertheless, he was old enough to take part in the war when his own national army was destroyed by the French Army. His understanding about the nature of war grew even deeper during the early 1810's, when he witnessed how the French Army almost literally withered away on the Russian steppes. The wounds that the war had left to his body and to his mind did not leave him in peace. The memories of the war tortured him, and he was unable to think about his experiences without the feeling of terror. He even had to relieve the pain with opium, or by taking waters at a spa. His criticism against his contemporary military writers seems to have intelligible grounds, when the criticism is placed in the context of his own harsh and traumatic experiences.¹² Therefore, it is only natural that, for example, the concept of friction has been understood as being based on his experiences from actual war, instead of being constructed with a scientific method.

Clausewitz is well known and much read. After his death, his argumentation has constantly been put under heavy critique.¹³ While still alive, however, he also criticized his contemporary writers for not understanding the phenomenon of war. Antoine-Henry de Jomini was one of the contemporaries whom Clausewitz criticized for developing a fantastic and one-sided system.¹⁴ This one-sided system can be understood as representing the tradition of examining the major battle operations and the higher-level decision-making. Clausewitz did not understand this kind of approach to the theme, because he had experienced fighting a war in quite a different perspective, in a one-sided angle. This is why Clausewitz did not, explicitly, understand the meaning of Napoleon's manoeuvre *sur les derrières* which bears close resemblance to U. S. Army manoeuvre warfare theo-

ries.¹⁵ In addition, he rejected the principle of strategic envelopment in favour of that of concentration.¹⁶ This kind of approach to the theme appeared almost unorthodox, and as a reciprocal argumentation, Jomini presented some counter-criticism:

General Clausewitz, whose logic is frequently defective, maintains, on the contrary, [...] ¹⁷

Jomini referred to Clausewitz's argumentation and criticized his persistency of keeping the static and passive defence in mountainous areas without active attacks. If Clausewitz did not understand the positivistic argumentation that Jomini manifested, nor did Jomini understand the dialectical method that Clausewitz was using.¹⁸ This misunderstanding between military classics is familiar to the military discussion, especially during the 20th century, but the dialogue is still going on. What is typical, however, to the critique on Clausewitz's thinking is that it often focuses on his work in its entirety, or on what Clausewitz represents through his writings. In fact, there is surprisingly little critique on specific issues within Clausewitz's work. A potential reason for this might be that his manner of writing, while reflecting his own experiences of war, may be intimidating, or at least exceptional. Furthermore, Clausewitz's thinking is not very easy to grasp. These kinds of issues, quite naturally, may give rise to discussions that, despite their volume, lack in analytical focus.

Method

The aim of this research is to consider and theorize the dynamics of friction, i.e. the mechanisms that bring about its effects. The research involves reconstructing Clausewitz's view on friction and developing the

notion further. In this, Kaisu Mälkki's¹⁹ theory was utilized as a complementary theory offering understanding of the aspects, which appeared insufficiently conceptualized in Clausewitz's view, based on the analyses and when considered from the viewpoint of this research. The methods used were rational reconstruction²⁰ and different philosophical and conceptual analytical methods.²¹ In the following, while discussing the methods in more detail, we outline the central premises and methodological perspectives orienting the research.

Within previous research on friction, the viewpoint of the actual dynamics of friction has been largely unaddressed within both scholarly discussion and Clausewitz's work. Although Clausewitz has not considered this issue as a theoretical concept, his writings, being the original source of the concept, may be seen as the natural basis for further developments on the notion of friction. Therefore, as the first phase, following rational reconstruction,²² we aimed at reconstructing Clausewitz's notion of friction from the viewpoint of our research.

More specifically, we conducted a conceptual analysis²³ of Clausewitz's conceptualization: we detected his different references to the concept and juxtaposed these with one another. We aimed at gaining a deeper understanding of friction by systematically examining the issues Clausewitz implies with his writing, but may not have explicitly examined. As a result of this phase of analysis, we reconstructed the central elements of the concept, and specified the fruitful and limited aspects of Clausewitz's conceptualization from the viewpoint of our research. The limited aspects were taken as the guidepost indicating the direction from which more understanding could be gained. To deepen the understanding of the aspects insufficiently conceptualized

within Clausewitz's view, we utilized, as a complementary theory, Mälkki's²⁴ view on the comfort zone and edge-emotions, as it includes specific considerations regarding these aspects. As the second phase of the research, also this complementary theory was analyzed in order to detect its fruitful and limited aspects from the viewpoint of our research. In the third phase of research, the fruitful and limited aspects of both theories were juxtaposed with one another. Conceptually coherent as well as incoherent issues were detected and analyzed. Based on these analyses, and conceptually bridging the gap between these two theories, we developed the theorization of friction further, in terms of its dynamics.

By focusing on the dynamics of friction, we did not seek to offer ready-made answers or straight-forward predictions as the results of the study. Rather, our intention was to bring into view and explicate the dynamic nature of the processes that form the phenomenon of friction in order to offer analytical tools for examining these in various real-life situations.²⁵

Following Peter Paret, we regard friction fundamentally as an individual phenomenon. That is not to say that we would deny its existence on large groups of individuals or in organizations, or the influences these may have for the individual. Rather, we assume that the effects of friction formed on the social level have their anchor within the individual. In essence, we assume that friction is formed as a result of the interaction between the biological, psychological and social (and cultural) dimensions, thus not being localizable to any of these exclusively.

Clausewitz's writings have been considered as stemming from his personal experience rather than derived from theory. Furthermore, they have been considered to

be rather theory-opposed.²⁶ Nevertheless, his view on friction may be regarded as a theory, in the sense that we, in this study, regard a theory: we understand a theory as a conceptualization concerning a particular phenomenon; it is a conceptual entity with which explicating a particular phenomenon, its constituting processes and dynamics²⁷ is attempted.

These kinds of theories may be seen to be in a never-ending progress, instead of being assumed to reach completeness at some point. They will not, however, develop automatically, but rather through continuous questioning and refinement. In essence, more understanding of the phenomenon may be gained by not taking the existing theorizing for granted.²⁸ From this viewpoint, theory development refers to building further conceptualization concerning the specific phenomenon. In this study, our aim is to consider and theorize the dynamics of friction. In the following, we consider the first phase of the research, the analysis and rational reconstruction of Clausewitz's view on friction, which aims at reconstructing the fruitful potential of Clausewitz's view for the considerations on the dynamics of friction.

Reconstructing Clausewitz's view on friction: The two elements as ingredients of friction

Based on our analyses, we suggest that the notion of friction comprises two elements that are of a different nature and, consequently, of researchability:

- 1) The factors: for example danger, physical exertion, intelligence, bad weather
- 2) The effect: our judgment being restricted

Factors causing friction

The first element, factors, is the one most often referred to in the literature. This is no wonder, as Clausewitz is explicit in his treatment on different factors that "coalesce to form the atmosphere of war".²⁹ Some examples of these are danger, physical exertion, intelligence and bad weather. These elements are not, however, to be taken as a definite list of components of friction in itself. Rather, when discussing the notion of friction, they are to be taken as illustrations of various factors that may cause impediment to action. Consequently, we suggest, that the core of Clausewitz's notion of friction is *the effects* of these different factors. As Clausewitz concludes, "*in their restrictive effects* they can be grouped into a single concept of general friction."³⁰(the italics are ours) That is to say, their impeding effects are the issue common to them in terms of friction.

In essence, Clausewitz indicates that "it would take volumes to cover all difficulties", and "we give these examples simply for illustration."³¹ Thus it may be seen that with regard to friction, the focus is not on these factors as such, but in what is common to all these different issues, i.e. the effects that they bring about. Therefore, in order to deepen the understanding of friction, the necessary issue to examine is these effects. This is what we turn to next.

The effects of friction

In various instances, Clausewitz describes the effects of friction in both figurative and explicit terms. For example, as a result of danger, which is one of the most obvious sources of friction, "the light of reason is refracted in a manner quite different from that which is normal in academic speculation".

Further, in these instances “the ordinary man can never achieve a state of perfect unconcern in which his mind can work with normal flexibility”.³²

These instances imply first that friction may have an influence on the individual level instead of affecting organizations as such. This is highlighted also by Clausewitz:³³

The military machine – the army and everything related to it – is basically very simple and therefore seems easy to manage. But we should bear in mind that none of its components is of one piece: each part is composed of individuals, every one of whom retains his potential of friction.

Second, these instances imply that the effect that friction brings about focuses predominantly on our mental capabilities. This is further emphasized by passages in which Clausewitz considers the issues that may improve one’s ability to overcome friction or cope with it. Namely, according to Clausewitz,³⁴ “the mind must be made even more familiar with them than the body.” He suggests to “plan [peacetime] manoeuvres so that some of the elements of friction are involved, which will train officers’ judgment, common sense, and resolution”.

Third, and most importantly, the above instances illuminate the kinds of effects that friction may entail: While under the influence of friction, we are not able to exploit our normal mature ability to reflect when judging situations. The “light of reason” may be refracted, and we are unable to think as flexibly as in normal situations. Furthermore, Clausewitz indicates that friction may bring us the inclination to rely on “first impressions”, which could potentially lead us to make hasty and unsound decisions.³⁵

Based on the above, we may conclude that the effect friction brings about is that it

impedes our ability to reason, and it weakens our judgment.

Overcoming friction

Furthermore, the effects of friction may be seen to be intensified or diminished based on whether we are aware of these effects. This is implied by the following excerpt:

The best general is not the one who is most familiar with the idea of friction, and who takes it most to heart (he belongs to the anxious type so common among experienced commanders). The good general must know friction in order to overcome it whenever possible, and in order not to expect a standard of achievement in his operations which this very friction makes impossible.³⁶

This excerpt indicates that in order to overcome friction or to cope with its effects, it is important *to know friction*. Further, knowing friction would enable one to anticipate its effects, i.e. that one is not capable of living up to one’s plans. As the effects of friction were above shown to involve inhibitions to our performances, “to know” friction may be seen to refer to an awareness of the inhibition brought about by friction. This, then, would make it possible for one to anticipate shortcomings in later, similar instances. The benefits of being able to anticipate may be seen to refer, on the one hand, to being able to make more realistic plans and decisions. On the other hand, this would diminish the disappointment resulting from being unsuccessful due to the friction.

The latter case is illustrated also in the following excerpt:

Exertions must be practiced, and the mind must be made even more familiar with them than the body. When exceptional efforts are required of him in war, the re-

cruit is apt to think that they result from mistakes, miscalculations, and confusion at the top. In consequence, his morale is doubly depressed. If maneuvers prepare him for exertions, this will not occur³⁷; the emphasis is ours).

The above excerpt implies that if the problems are interpreted as solely depending on, for example, mistakes and miscalculations, it may lower one's morale more than they would if seen more realistically as partly affected by friction. Recognizing the effect of friction would, in this case, offer the military person an explanation to the situation which would make the shortcomings more understandable, and possibly more (socially) acceptable.

To sum up, based on the above analysis it appears that overcoming or coping with friction is essentially a question of becoming aware of the effects that impede our judgment and, consequently, our performance. If we are not aware of this kind of influence, we may continuously keep making plans that are unrealizable, or end up explaining the shortcomings in ways that blur our judgment of the actual situation even more.

With regard to this issue, Clausewitz's thinking, however, involves somewhat contradictory aspects: on the one hand, he explicitly emphasizes the need to practise for friction in peacetime contexts, and the possibility of involving "elements of friction" in [practice] maneuvers.³⁸ On the other hand, he states that friction may be inconceivable unless one has experienced war.³⁹ The ostensible inconsistency among these references may become intelligible within the light of a third reference of his text: Clausewitz suggests that for those who have not experienced war, it may be beneficial to consult someone who both has experienced war and is able to conceptualize one's experience.⁴⁰ This indicates that the mere experi-

ence of war, or friction, may not be enough in order to be able to help others in practising to overcome friction. Rather, in order to teach others in terms of friction, one needs to be able to conceptualize one's experience of this, which in itself may not be automatic or easy. This is further implied by the above excerpt referring to the common "anxious type" of commander, who takes friction "most to the heart", but is not able to "know friction" in the sense that he would be able to overcome it whenever possible.

We suggest that these instances, in fact, point to the nature of friction: that the mere experience of it does not guarantee that one actually understands what has happened; rather, despite experiencing friction, we may remain unaware of its effects to our thinking. However, the crux of the matter is precisely the fact that we should realize and acknowledge that when experiencing friction, our "light of reason" becomes refracted and we are not capable of our normal mature judgment. This awareness of our thinking becoming impeded would, then, enable us to better anticipate our capability for performance under the effects of friction. Further, based on the above, it appears that this awareness of the effects of friction is essential also for the possibility of overcoming friction.

The bodily basis of friction?

The above consideration on the effects of friction portrays friction first and foremost as a phenomenon affecting our thinking. However, Clausewitz's writings imply that there may be a bodily basis for these mental impediments, as the following excerpts illustrate:

We are prevented from making an apparently justified statement by our feelings,

which themselves act as a higher judgment.⁴¹

The senses make a more vivid impression on the mind than systematic thought...⁴²

The above excerpts indicate that bodily aspects may be contributing to the effects of friction considered above. This issue is not, however, discussed more in detail in Clausewitz's book. From the viewpoint of our attempt to consider and theorize the dynamics of friction, this would be an important aspect. In essence, exploring the basis for the shortcomings of our judgment, as well as for the possibilities to overcome this, would offer us more understanding of the dynamics of friction. Although Clausewitz has not examined this issue further, we may, however, utilize the building blocks explicated in this chapter. Based on them, we may look for a complementary understanding from more contemporary research.

To sum up, based on the analyses of Clausewitz's view on friction, in this section we suggested that his view on friction is fundamentally comprised of two elements of a different nature: The first is the *factors* of friction, which, together, form "the atmosphere of war".⁴³ These factors may not be entirely anticipated or controlled. In fact, many of these factors are essentially dependent on chance. These factors, or the atmosphere of war, in itself, are not the essence of the concept of friction, however. Rather, we suggest that the core of the notion of friction is the second element, *the effects* of friction. These effects may be summed up as follows: the friction *impedes our ability to reason and it weakens our judgment*.

These issues regarding the effects of friction, in fact, imply a point of view based on the human sciences to warfare (but also to any crisis situations potentially faced by police or firefighters, and any other citizen in the middle of normal life). Furthermore,

Clausewitz's book offers a rather discernible outline for these. Therefore, it appears that this second element of the concept of friction is more researchable than the first element. In addition, Clausewitz also briefly considers the ways of overcoming friction, and practising this. Further, he implies that these effects of friction, which appear cognitive in nature, may to some extent have a bodily or emotional basis.

The issues presented above, concerning the effects of friction, their basis, and the possibilities for overcoming these, indicate Clausewitz's understanding of the dynamics of friction, while being insufficient, as such, for explicating the nature of friction and the processes involved. From the viewpoint of our research, these indications offer signposts regarding the directions from which we may gain more understanding of the dynamics of friction. This is what we turn to next.

Complementary theory: comfort zone and edge-emotions

Based on the above analyses, we suggested that Clausewitz's view on friction comprises two elements of entirely different nature. The first is the factors, an indefinite list of variables causing friction, most of which are largely due to change. The second, more definable element is the effects of these countless factors. Above, we summed up that these effects refer to our judgment becoming impeded. Further, based on Clausewitz's writings, we inferred that bodily aspects possibly have a role in this. The latter two issues may be seen to be Clausewitz's most important notions indicating the dynamics of friction, i.e. the underlying processes that in essence bring about the effects of friction. However, as he

has not considered these issues in more detail, it is our purpose, in this section, to examine these notions further. In order to explore these issues, and to theorize the dynamics of friction, we utilize a complementary theory that sheds light specifically on these issues. In the following, we will first briefly discuss this complementary view, and in the next section, bring these two viewpoints together in order to theorize the dynamics of friction.

A complementary theory suitable for exploring further the restrictions on our thinking and the possible bodily basis for these may be found in our previous research. Namely, Kaisu Mälkki's⁴⁴ view concerning comfort zone and edge-emotions involves consideration precisely on the ways in which our thinking is affected by (bodily) emotions, in normal as well as in critical situations. In its entirety, this theory deals with the nature and prerequisites of reflection in adult learning. The theory is based on an analysis of both Mezirow's⁴⁵ adult educational theory of transformative learning and Damasio's⁴⁶ neurobiological view on emotions and consciousness.⁴⁷ For the purposes of this study, the theory is considered here in terms of its fruitful elements concerning the issues insufficiently considered within Clausewitz's writing in order to shed light on the dynamics of friction.

In the following, we will briefly discuss first the emotional and then the cognitive dimension. Following that, we bring these two dimensions together, in order to explicate the way in which these are intertwined, and further, how this enables explicating the ways in which our thinking may be impeded by emotions.

Emotional dimension

The basic function of emotions is to ensure survival: they function in favour of life

regulation by helping an organism stay out of danger and to bring about advantageous conditions for maintaining life.⁴⁸

A threatening situation automatically arouses emotions that motivate quick reactions and orient attention accordingly, for example when we become cautious on the top of a cliff, or automatically swerve away from approaching objects or vehicles, as well as when in serious situations we are automatically able to harness all our capabilities for "fight or flight". Based on emotions, we are capable of automatically avoiding and protecting ourselves from danger on the one hand, and to seek comfort and safety on the other. With our conscious cognitive capacity, we would be unable to make such quick conclusions required for survival. Furthermore, we use emotions as indicators of whether our surroundings are safe and suitable for us. Biologically, we regard unpleasant emotions as signals of something suspicious taking place, and consequently naturally want to dispose of both the feelings experienced as uncomfortable and the instances in which they were aroused.⁴⁹ Correspondingly, when we feel ourselves to be safe, we become relaxed and believe we are safe. We, like other living organisms, have been programmed with life-support systems that take care of fundamental reactions with the help of emotions.⁵⁰

Cognitive dimension

The basic nature of the cognitive dimension, in turn, may be considered with the help of the concept of meaning perspective. Meaning perspective refers to the set of assumptions which orients our perceptions, thinking, feeling and action. It is based on our previous experiences and our biographies, and is shaped by our culture and

relationships. Understanding, or giving meaning, is based on grasping the world with our assumptions and expectations (which have been formed through previous experiences). We are able to understand, since the meaning perspective orients our cognitive processes based on our previous experiences and assumptions, thus bringing continuity to our world. At the same time, this limits our view by orienting us away from impulses that we would not be able to understand within the light on our previous experiences. At the fundamental level, however, this enables us to maintain our view of the world as well as our sense of stability, community and identity.⁵¹

Comfort zone and edge-emotions as the emotional orientation of our thinking

Above, we discussed the cognitive and emotional dimensions separately, in terms of their basic natures. However, in humans these dimensions are no separate compartments, but are, on the contrary, fundamentally intertwined.⁵² On the one hand, the cognitive processes are powered and influenced by the emotions, and, on the other hand, both culturally, socially and personally shaped meaning perspectives contribute to the perception of danger and safety, and consequently, whether the emotions and feelings associated with a situation are experienced as unpleasant or enjoyable.⁵³

More specifically, the way our thinking is influenced by emotions is a question of how the emotions, oriented to ensure survival, support also the intactness and fluency of our cognitive processes. In other words, the same emotions that provide us with the reactions aimed at keeping us alive physically and biologically take care of the flow of our cognitive processes by protecting

the intactness of the meaning perspective as well. While physically we may face threat whilst, for example, being in danger of some sort, a mental threat would refer to instances in which we experience a threat of chaos, as we are unable to understand, within the light of our previous understanding, what is happening in the situation or within us. Also, the intactness of our meaning perspective becomes challenged when something or someone questions our basic values, attitudes or cherished beliefs, or in an extreme case, our sense of self. These are examples of instances in which the emotional protection mechanism becomes activated.⁵⁴ This mechanism may be considered through the concepts of comfort zone and edge-emotions.

The comfort zone and edge-emotions may be seen as the emotional dimensions of the meaning perspective discussed above. In other words, if we are not able to keep up the normal functions of meaning perspective, and something threatens the continuity and coherence of the meaning perspective (i.e. we are not able to understand based on previous understanding, or our values and beliefs are being questioned), we experience unpleasant emotions. These unpleasant emotions orienting from the meaning perspective being questioned are termed edge-emotions. Correspondingly, when nothing questions the meaning perspective, we are able to interpret situations non-problematically based on our previous understanding, and the world appears comprehensible; we do not experience these unpleasant emotions, but, rather, feel ourselves fundamentally safe and comfortable. The term comfort zone, in turn, refers to this mental zone in which we feel ourselves comfortable as nothing questions our meaning perspective, the associated assumptions, values and beliefs, or the fundamental experience of

continuity. The edge-emotions introduced above are called edge-emotions because they appear on the edges of the comfort zone.⁵⁵

The same emotional reactions above described as ensuring survival on the biological and physical level are also embodied in the comfort zone and edge-emotions in order to ensure the intactness of the cognitive processes. The comfort experienced at the comfort zone indicates (whether we are aware of it or not) being safe and in balance, and tends to be maintained. Conversely, the edge-emotions arising at the edges of the comfort zone indicate that the continuity or coherence of the meaning perspective is being threatened. Similarly, as we react automatically in terms of physical threats (e.g. escape or attack) in order to ensure survival, the emotional influence on our thinking entails automatic reactions as well.⁵⁶

The edge-emotions may, in figurative terms, be seen as “the anaerobic threshold of the mind”. As the anaerobic threshold informs that the limits of the body are being reached, by bringing about unpleasant feelings,⁵⁷ the edge-emotions may also be seen as the guard-dogs raising an alarm of the comfort zone being exceeded. Fundamentally, the edge-emotions serve to keep up the coherence within our consciousness by protecting the intactness of the meaning perspectives. The anaerobic threshold, if encountered for the first time, brings us the tendency to slow down or stop running, for example. Similarly, also the edge-emotions entail tendencies for action. In terms of physical threat, the emotions orient us to avoid danger or to protect ourselves, for example by fight or flight. Similar mechanisms take place also at the mental level, when we protect ourselves through a mental fight or flight reaction in order to return to the comfort zone. We may use psychological, interpretative means, such as automatically avoiding to deal with the

issue, making excuses, or interpreting it so it no longer appears as a threat to our values or understanding. For example, in the case of a quarrel with a friend or spouse, we may blame the other party so as to avoid dealing with our questioned assumptions; or we may throw all kinds of insults without actually meaning them in order to defend our viewpoint. In this way, our emotions orient us to bring about explanations to situations that protect our own beliefs.

When we are out of our comfort zone, emotions become activated in order to alert our body of a state of imbalance. Consequently, our thinking is oriented, through emotions, first and foremost to restore the balance, i.e. the comfort zone.⁵⁸

While this emotional orientation of thinking may be seen as a necessary mechanism for maintaining the flow of our cognitive processes, it simultaneously brings about limitations to our perception and thinking. For instance, when our values or assumptions become questioned, edge-emotions may arise to protect their intactness. In this case, our tendency is to try to dismiss the questions by either attacking, defending or escaping mentally, i.e. by verbal and interpretive means. Thus, in threatening instances our sophisticated processes of thinking are harnessed to protect our comfort zone. In situations like these, our thoughts, interpretations and decisions do not often manifest the optimal breadth, flexibility and criticalness of our cognitive functions, but quite the opposite, they exemplify deductions that are rather restricted, biased and purpose-oriented.⁵⁹

That is to say, when our comfort zone is threatened, emotions orient our interpretations most of all to restore and maintain our feelings of safety and our normal “order of the world”. This intention is more fundamental, and thus the intention of un-

derstanding any particular situation will be subordinated. Therefore, by our interpretations we aim to bring about order to the world, an outline to situations, and quick solutions in order to fix and reduce the unpleasant feelings or threatening situations. Our biological emotional system strives to bring us back to the comfort zone by the means available to it.⁶⁰

The above view indicates the way cognition and emotion are intertwined in terms of our judgment being oriented by emotions. To ensure survival, the emotions support our attention towards the familiar paths of thinking and interpreting in ways that actually significantly decrease our ability for mature, flexible and open-minded judgment.

Overcoming the limitations

These limitations to our thinking considered above, although taking place automatically and regardless of whether we are aware of them or not, are not completely out of our reach or out of control, either. In order to continue with the analogue to the anaerobic threshold at the physical level, we may consider the possibilities for coping with and overcoming these limitations. In essence, although it informs one of a strain in the organism, the anaerobic threshold is not as absolute and compelling as it may feel initially. Through training, we may shift the threshold further, and learn to cope with performing in the anaerobic zone to an extent, even though we cannot remove the threshold due to its biological basis. In this, the essential issue is our attitude towards the unpleasant feeling on the anaerobic threshold, i.e. whether we are automatically oriented by the tendency entailed with the emotion, or are capable of enduring the unpleasantness of being at our limits while keeping going regardless.⁶¹

In terms of edge-emotions, the issue is

similar yet more complex. Based on edge-emotions, we are naturally inclined to orient our thinking in a way that allows us to return to the comfort zone, instead of aiming to understand the situation openly. In order to dismantle this automatic pattern, we first need to recognize (to become aware of) this orientation in ourselves. In the case of running and the anaerobic zone, the choice is more concrete and palpable, i.e. whether to slow down or try to keep running, in spite of experiencing the unpleasant emotions. In contrast, in the case of edge-emotions it is our perceptions, attention and thinking that become oriented, and this is obviously more difficult to discern. We may be unaware of this, as we may figuratively speaking be able to fix the issue before we realize there was a problem. In order to broaden our thinking at the edges of our comfort zone, we need to learn to acknowledge the edge-emotions and the way in which our thinking in these instances is biased towards restoring the feelings of comfort.⁶²

To sum up, the above view on comfort zone and edge-emotions explicates the nature of the emotional influence on our thinking, and considers the ways to learn to overcome this. While this theorization deepens the understanding of the issues considered in Clausewitz's book, it remains limited in terms of considering the context. In other words, in addition to mental threat and chaotic situations, these limitations on our thinking may also stem from actual danger, which is one of the most important sources of friction according to Clausewitz. In the next section, we bring together these two viewpoints, in order to consider the nature and dynamics of friction, while paying attention to the first element (factors of friction) that indicates the context of warfare, from which the concept originated.

The dynamics of friction

Based on the analysis of Clausewitz's considerations on friction, we concluded that his view offers signposts to reaching further understanding of the dynamics of friction, in the form of unanswered questions concerning the nature of friction. In the previous section, we brought into view a complementary theorization that deals with the issues insufficiently considered within Clausewitz's view. In this section, we bring these two viewpoints together, in order to explicate the dynamics of friction by answering the questions raised by Clausewitz's analysis. Furthermore, in the last section we consider more broadly the context of war indicated both by the factors involved in Clausewitz's view and the issues related to military organization, to its personnel and on organizational activities.

The questions derived from the analysis of Clausewitz's view were as follows:

1. *Where do the impediments to our action come from? Why do we yield to first impressions and lose some of the flexibility of our normal thinking? How, in fact, do the emotions and bodily aspects contribute to that?*

With the concept of friction, Clausewitz describes how our normal mental functions are distorted, restricted and blurred in war.⁶³ The basis for these impediments can be localized in our emotional mechanisms. At the basic level, this mechanism orients us, both through unconscious reactions and more conscious tendencies, to functional action in order to ensure survival. This, however, does not only involve protecting the body, but ensuring the intactness of our cognitive processes, or meaning perspective, as well. Unpleasant feelings are not only aroused in

the event of danger and pleasant experiences when we are safe, but these feelings are also activated by the cognitive processes, both when they are running smoothly and when they are threatened. That is to say, in chaotic situations when we are unable to understand, or when human interaction questions our values and beliefs, we are no longer in the comfort zone but, rather, experience unpleasant edge-emotions. Furthermore, our personal meanings are socially constructed and bind us with the like-minded. Therefore questioning them brings the social connections they create under question, too.⁶⁴ The unpleasant emotions associated with instances of physical or mental threat provide us with automatic reactions and tendencies to seek safety and avoid danger. In the case of mental threat our tendency is to try to restore the comfort zone.

For example, in a chaotic situation we may bring about feelings of safety by forming quick interpretations of the situation⁶⁵ – the quicker we are, the faster we may lessen the anxiety resulting from being unable to understand. Furthermore, the more familiar and unambiguous the explanation, the more we may feel ourselves in control of the situation in order to reduce the feeling of insecurity. This may take the form of hasty decisions, precipitate judgment and simplistic interpretation of the situation.

Furthermore, in a case of our values being questioned, we may aim to return to the comfort zone by interpreting the situation in a way that protects us from facing incompleteness, and enables bringing about socially acceptable or desirable explanations. For example, if we make a mistake, we often blame somebody else and make excuses for our behaviour. These interpretations facilitate our return to the comfort zone by enabling us to avoid dealing with the matter, and thus, to avoid experiencing incomplete-

ness and feeling ashamed in front of significant others.

These examples indicate ways in which our thinking, in critical instances, may be oriented by emotions towards restoring the comfort zone, instead of being able to interpret situations openly and make mature judgments. Thus, as a further development on Clausewitz's notion of friction, we suggest that the effects of friction are first and foremost a matter of how the biological emotions affect our cognitive functions in order to protect the intactness of these. Our comfort zone becomes exceeded in the physically and mentally strenuous conditions of the battlefield, and, as a result of reacting to the unpleasant edge-emotions, we end up expounding situations based on first impressions that serve more the return to the comfort zone than, for example, gaining a thorough grasp of the situation.

The more judgment the solution to the situation requires, the more susceptible we are to the effects of friction on our performance. Experiencing the emotions indicating threat brings us the tendency to aim, as the high priority, at restoring the feeling of safety. Although the threat would be of a physical nature, by quick interpretations of the situation we may diminish the experience of threat and chaos while lacking in mature judgment and accurate perceptions.

2. *What makes both overcoming friction and practising for this so difficult, as Clausewitz implies?*

Above we discussed the basis for the effects of friction, i.e. what are the origins to the impediments to thinking that friction brings about. Furthermore, this explanation involved conceptualization concerning the role of emotions in this. Apart from these, based on the analyses we aimed to answer

the third question, which concerned the basis for the difficulties in both overcoming friction, and practising for this. The theorization considered in the previous section may be seen to offer an understanding considering these questions as well.

Clausewitz indicates that in order to overcome friction, one must know it. In the previous section, we suggested that knowing friction refers to realizing and acknowledging the limitations to our thinking that friction brings about. Above, we specified that these limitations are associated with unpleasant feelings, or edge-emotions, and stem from our tendencies to maintain the comfort zone. In contrast to the ways in which, at our best, we may be capable of flexible thinking and mature judgment, in these instances when our comfort zone becomes exceeded and we experience edge-emotions, our thinking narrows and becomes purpose-oriented towards restoring the comfort zone.

Considering the fact that these reactions, in essence, protect us from facing our incompleteness and insecurity (which, in itself, we experience as a mental threat), the difficulties in knowing friction appear understandable. Namely, knowing friction would require us precisely to realize this nature of our thinking that, contrary to what we would like to believe, it is often far from rational, mature and open-minded. In fact, for the sake of avoiding facing our flaws, we often assume ourselves as being more rational than we actually are. This very assumption, and the accompanying emotional protection of it, is the tip of the iceberg concerning what makes acknowledging and knowing friction from our own experience so difficult. In other words, knowing friction is a matter of becoming willing to experience, feel and realize the ways in which being at the edges of our comfort zones may result in our

thinking becoming limited. The point is not, however, to find the “right” assumptions as such – if any exist – but to identify, within the restricted interpretations we assumed rational, the emotional orientation towards the avoidance of dealing with particular issues or feelings.

Disentangling this seemingly natural pattern forms the challenging task of trying to understand friction. The reactions implied by the concept of friction are closer to us than we dare to realize, and precisely here lies the difficulty in utilizing this understanding. This may appear to be an issue of concern merely to each of us as individuals, and to our private attitudes towards becoming aware of our bodily and mental reactions and tendencies. However, equally important is the fact that our cultures have an effect on our attitudes towards such issues. Namely, through the influence of our culture we may have learned to neglect dealing with these kinds of feelings and reactions. Military training, for example, may bring about particular reactions and attitudes towards emotional issues, making mistakes and discussing these with others. If the culture in general, or the significant other (oklart vad som menas med ‘..the significant other’...! Det verkar som om det saknas ett ord efter ‘other’. Kan ev. menas: ‘...the significant other culture’) in particular, is not supportive in dealing with the actual effects of friction as well as their basis, the difficulty in getting to know friction is doubled. We may experience our comfort zones to be threatened also by deviating from socially accepted scripts (as our sense of identity partly leans on the sense of community and belonging to relevant reference groups). In fact, Brookfield⁶⁶ has introduced the notion of cultural suicide to refer to these kinds of instances, in which we risk social acceptance and dare to go against the social current.

To sum up, friction is often regarded as a phenomenon of chance and misfortune, and is seen to hinder the true potential of a group. However, in this article it has been argued, along with Clausewitz, that each individual within a group or an organization retains his/her potential for friction, and, as a consequence, the group may not function as efficiently as planned.

The importance of this concept does not manifest itself in shattering moments on the battlefield, but, rather, both before and after facing the reality of war. The concept is definitely not a tool for wisdom in hindsight, or an excuse for all misadventures faced in military action. It is of crucial importance to be able to reflect, in advance, on our presumptions and our tendencies to choose particular lines of operation. We will find out about our own limits, if we are willing to open our minds sufficiently. Thus the difference between real war and war on paper is only partly due to chance and, in consequence, only partly uncontrollable and conceptually intractable. The other part is the human experience of friction and the consequent limitations and restrictions that are, to a certain extent, scientifically graspable and possible to practise.

Discussion

Clausewitz reflected on his experiences and, at the same time, generalized this experience of human behaviour on the real battlefield. Friction is one of the most important notions he ended up considering through his reflective process, after experiencing harsh battlefield conditions. It can be argued that he himself was a victim of PTSD symptoms⁶⁷ (Post Traumatic Stress Disorder) and that these caused long-term physical, emotional and social influences. It can also be argued that Clausewitz managed to conceptualize

the effectiveness of battle stress and different phases of adaptation to combat (first battle, experienced veteran, overstressed veteran⁶⁸). It remains unclear if the possible PTSD could have influenced the way Clausewitz made his argumentation, and how much that could have influenced the formulation of the term friction. But then again, as we have argued in this paper, the effects of friction are part of the basic biological processes that ensure the fluency or our cognitive functions as well as survival, also in everyday contexts.

His experiences had, nevertheless, deepened his understanding of the fact that the true nature of actual war is far removed from war on paper. This discovery is clearly argued in his concept of extremities (die Äußerste).⁶⁹ According to Clausewitz, there were three levels of extremes. The nature of the first extreme is based on the level of strategic and also national-level phenomena. The first extreme is concerned with issues that take place before the actual fighting has begun, such as the atmosphere and indications of 'will' or 'morale'.⁷⁰ These issues are often assumed to correspond with the nation's actual capabilities to act,⁷¹ although they represent mere intentions in Clausewitz's concept. Hence, it is important to understand that all nations and communities contain their particular way of expressing their viability, which can take forms that are fervent and filled with heightened emotion.⁷² The second level of extremes is the phase when the belligerents are preparing to face each other as living forces. It is the moment of the clash of intentions. Nevertheless, it is not until we have reached the 3rd extreme that real warfare will reveal its devastating nature, to human body and to human mind. During this extreme, the fighting forces must prepare to face real war and therefore also reciprocal action. It is actu-

ally this third extreme that is of the most crucial importance, because it exposes the genuine preparedness of the belligerent to put its fighting ability into practice. The genuine aim of all military operations is to suppress all resistance. Hence, the true effects become evident only when living forces sufficiently increase their resistance vis-à-vis the opponent.⁷³

The connection and link between the third extreme and friction is interesting, but at the same time problematic. In this article, it has been suggested that the concept of friction is not dependent on the physical experience of the 3rd extreme, as friction is inherent in any kind of human activity. In addition, it should be understood that friction might be accentuated in critical and chaotic situations, where the danger and the fear of death emerge. The refractive error of reason⁷⁴ is even more crucial when leaders at any organisational level are trying to understand the situation,⁷⁵ but the ability to separate the relevant information from the irrelevant information is disturbed by the effects caused by friction. Clausewitz understood this refractive error of reason and its crucial importance in the leadership of strategic level of warfare:

The higher a man is placed, the broader his point of view. Different interests and a wide variety of passions, good and bad, will arise on all sides. Envy and generosity, pride and humility, wrath and compassion – all may appear as effective forces in this great drama.⁷⁶

In this article, so far, there have not been any suggestions whether the concept of friction has any relation to military discipline. It is even more interesting to consider that the basic idea around the theme of discipline and its importance have remained almost unchanged for hundreds of years.⁷⁷

It is an almost self-evident fact that the disciplinary methods and the military routines are important in order to overcome the chaotic conditions of the battlefield – a feature that has always prevailed in the battlefield. During the period of linear tactics, the systematic courses of action helped the individual to overcome fear when facing the enemy in the battlefield.⁷⁸ These kinds of interpretations are still valid in our own time. In FM 3-0, it is stated that "the trained and disciplined soldiers are the single most important element of any command and control system."⁷⁹ This kind of argumentation is based on the idea that the teaching of discipline is only a beginning and not the outcome of military performance (disciplinära soldater i träning), as it is more important to be able to educate the military organisation to face real war (träna soldater i disciplin).⁸⁰ Despite the efforts to strengthen the discipline and make the military units more coherent, the reality of the battlefield and the elements of chaos, chance and friction actually confirm that something more is needed to understand war as a human phenomenon. Within the light of the theory presented in this article, we suggest that the training and routines may bring about feelings of control and safety to instances of chaos. However, the concept of friction captures the fact that inevitably we will face our limits in war, and thus will end up out of our comfort zones.

That is why, in training, it is equally important on the one hand to strengthen and enlarge our comfort zones so as to maintain flexibility and consideration for as long as possible, and, on the other hand, to learn to acknowledge the effects of friction on our performance in order to decrease the refractive error of mind we drift into at the edges of our comfort zones.

Hence, the astonishing military capability of different kinds of irregular military organisations in our own time in Afghanistan and in Iraq has hardly anything to do with superior discipline, in the way we understand this term, but on their ability to understand and tolerate the effects of friction at the personnel level. Hence, the great performance of the Finnish Armed Forces during the Second World War was not due to an iron discipline or superior art of war, either. It was produced by the comprehension that only self-assertive soldiers could be effective in the harsh conditions of the battlefield, where soldiers had to rely on themselves and their ability to deal with situations, instead of relying on discipline, which would only be an external help on the battlefield.⁸¹

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Notes

1. Clausewitz was born in 1780 in Burg, about 100 kilometres southwest of Berlin. He became famous for criticising the manner in which theories were used to generate doctrines of rules of action. He saw that knowledge and performance must be separated, though utilitarian benefits may be had from valid theories. He served in various armies, and in 1819 began his writing of *On War*. After eight years, he had completed the first six of eight planned parts. His work was left uncompleted, due to his death in 1831.
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3. *Militärstrategisk doktrin*, Försvarmakten, Stockholm 2002, p. 20.
4. Scales, Robert H.: "The Second Learning Revolution", *Military Review*, January-February 2006, p. 37.
5. *FM 3-0, Operations*, Headquarters, Department of the Army. Washington, DC, 27.2.2008. Introduction, 1-15.
6. See op. cit. note 2, Watts;
See also Beyerchen, Alan: "Clausewitz, Non-linearity, and the Unpredictability of War", *International Security*, Vol. 17, No. 3, Winter 1992-1993, pp. 59-90; Jobbágy, Zoltán: "Scrutinising effects-based operations: On military genius, causality and friction in war", *AARMS* Vol. 7, No. 1, 2008, pp 167-174; Op. cit. note 3, *Militärstrategisk doktrin*.
7. FM 100-5. Headquarters. Department of the Army. Washington, DC, 1993.
8. *Ibid.* Chapter 6-24.
9. *Ibid.* Chapter 1-33, 1-81, 5-68, 6-24, 5-93, 6-102, 7-12, 7-54.
10. Holmes, Terence: "Planning versus Chaos in Clausewitz's *On War*", *Journal of Strategic Studies*, vol. 30, No. 1, February 2007, 129-151; Willimot, H. P; Barrett, Michael B: *Clausewitz reconsidered*, Praeger Security International, 2010, pp. 151-162; Kiesling, Eugenia C.: "On War, Without the Fog", *Military Review*, September-October, 2001, pp. 85-87; Op. cit. note 6, Jobbágy; Op. cit. note 2, Watts; Lonsdale, David J.: "Strategy: The Challenge of Complexity", *Defence Studies*, Vol 7, no. 1 March 2007, pp 42-64.
11. Clausewitz: *On War*, Princeton University press, 1989 p. 119.
12. Strachan, Hew: *Carl von Clausewitz's On War*, A Biography, Atlantic Books, London 2008, pp. 29-30, 51, 58, 63.
13. One of the most well-known critics is probably sir Basil H. Liddell Hart, who claimed that the conditions that were experienced during the First World War, were due to the blind imitation of Clausewitz's text being the real cause of the horrible conditions of the Western Front – see: Liddell Hart, Basil H: *Strategy*, Second revisited edition, Penguin Groups, England 1991.
14. Op. cit. note 12, p 8.
15. Leonhard, Robert R.: "Maneuver Warfare and the United States Army". Article in *Maneuver Warfare, An Anthology* edited by Richard D. Hooker, JR., Novato, CA 1993, pp. 42-56.
16. See: Op. cit. note 12, p. 114. Strachan does not make any link to Jomini but relies to on Hubert Camon's, a French military theorist and historian, interpretation of Clausewitz's neglect of not understanding the Napoleonic warfare.
17. Jomini, Henri de: *The Art of War*, El Paso Norte Press, 2005, p. 131.
18. About the dialectical method, see op.cit. note 12, p. 71.
19. Mälkki, Kaisu: "Building on Mezirow's theory of transformative learning: Theorizing the challenges of reflection", *Journal of Transformative Education*. (in press)
20. Davia, Gregg Alan: Thoughts on a Possible Rational Reconstruction of the Method of "Rational Reconstruction". A paper presented at the Twentieth World Congress of Philosophy, Boston, Massachusetts, August 10-15, 1998. <http://www.bu.edu/wcp/Papers/Scie/ScieDavi.htm>. Accessed June 8th 2010; Habermas, Jürgen: *Communication and the Evolution of Society*, Hienemann Educational Books, London 1979; Hannus, Susanna and Simola, Hannu: "The Effects of Power Mechanisms in Education. Bringing Foucault and Bourdieu Together", *Power and Education*, 2 (1), 2010; Rorty, R.: "The historiography of philosophy: four genres", in Rorty, R.; Schneewind, J.B. and Skinner, Q. (eds.): *Philosophy in History*, Cambridge 1984, pp. 49-76.
21. See Holma, Katariina: "The strict analysis

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22. Op. cit. note 20.
 23. See op. cit. note 21.
 24. Op. cit. note 19.
 25. Op. cit. note 20, Hannus and Simola; Malinen, Anita: *Towards the essence of adult experiential learning. A reading of the theories of Knowles, Kolb, Mezirow, Revans and Schön*, Sophi, University of Jyväskylä, Jyväskylä 2000; Op. cit. note 19; Whetten, David A.: “What Constitutes a Theoretical Contribution?”, *The Academy of Management Review*, 14(4), 1989, 490-495.
 26. Sumida, Jon Tetsuro: *Decoding Clausewitz: A New Approach to On War*, University Press of Kansas, Lawrence 2008; Op. cit. note 12.
 27. See Emirbayer, Mustafa: “Manifesto for a relational sociology”, *American Journal of Sociology*, 103 (2) 1997, pp. 281-317; Op. cit. note 19.
 28. See Layder, Derek: *Sociological practice. Linking theory and social research*. Sage, London 1998; Mezirow: *Transformative dimensions of adult learning*, Jossey-Bass San Francisco-Oxford 1991; Op. cit. note 19.
 29. Op. cit. note 19, p 122
 30. Ibid, p. 122
 31. Ibid, p. 120
 32. Ibid, p. 113
 33. Ibid, p. 119
 34. Ibid, p. 122
 35. Ibid, p. 122
 36. Ibid, p. 120
 37. Ibid, p. 122
 38. Ibid, p. 122
 39. Ibid, p. 119
 40. Ibid, pp. 120-123
 41. Ibid, p. 116
 42. Ibid, p. 117
 43. Ibid
 44. Op.cit. note 19; See also Luoma, Kaisu and Mälkki, Juha: “Preparing to experience the unexpected. The challenges of transforming soldiership”, in: *Tiede & Ase 2009. The Finnish Society of Military Studies*; Mälkki, Kaisu: “Ihmistieteellisiä lähtökohtia sotataitoon” [Human viewpoint into warfare], in Mälkki, Juha: *Sotataittoa ihmisten johtajille, Sotataittoa ja sen klassikot uudelleenarvioituna*, 2010. [Art of War for Leaders. Classical Writings of the Art of War Reevaluated], Kustannusosakeyhtiö Suomen Mies.
 45. See op. cit. note 28, Mezirow; Mezirow, Jack: “Learning to think like an adult. Core concepts of transformation theory”, in Jack Mezirow and Associates: *Learning as transformation. Critical perspectives on a theory in progress*, Jossey-Bass, San Francisco 2000, pp 3-33; Mezirow, Jack: “An Overview on Transformative Learning”, in Illeris, Knut (ed.): *Contemporary Theories of Learning. Learning theorists ... in their own words*, Routledge, London 2009.
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 48. Op. cit. note 46.
 49. Ibid.; Op. cit. note 19.
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 52. See op. cit. note 46, Damasio: *The feeling of what happens*.
 53. Op. cit. note 19.
 54. Ibid.
 55. Ibid.
 56. Ibid.
 57. Field Manual 22-51; *Combat Stress Behaviors*, Headquarters, Department of the Army, Washington 1994, Figure 2-1-2-2; Grossman, Dave: *On Combat. The Psychological Cost of Learning to Kill in War and in Peace*, Warrior Science Publications, 2007, pp. 51-60.
 58. Op. cit. note 19.
 59. Ibid.
 60. Ibid.
 61. Ibid.
 62. Ibid.

63. Ibid., pp. 113–114, 119–123; Paret, Peter: *The Genesis of On War, Article on Clausewitz' On War* p, 17; Op. cit. note 2, Watts.
64. See Brookfield, Stephen D: *The Skillful Teacher: On Trust, Technique and Responsiveness in the Classroom*, Jossey-Bass, San Francisco 2006; Mällki, Kaisu: “Rethinking disorienting dilemmas within real-life crises: The role of reflection in negotiating emotionally chaotic experiences”, *Adult Education Quarterly*. (in press)
65. See also op. cit. note 44 Luoma and Mällki.
66. Brookfield;
- Brookfield, Stephen: “Tales from the dark side: A phenomenography of adult critical reflection”, *International Journal of Lifelong Education* 13(3), 203–216, 1994.
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68. Combat Stress Behaviors. Field Manual NO. 22–51 (1994). Headquarters, Department of the Army, Washington, DC
69. See another interpretation from the idea of “extremes” from: Herberg-Rothe, Andreas; Honig, Jan Villem: “War without End(s): The End of Clausewitz?”, *Distinktion*, No. 15, 2007, pp. 133–150. The writers suggest that Clausewitz sought to situate actual war between extremes and that the modern discourses share the mistake of seeing the extremes as incompatible alternatives – war(s) should be threaded as a continuum of extremes, instead.
70. Janowitz, Morris: *Sociology and the Military Establishment*. Russell Sage Foundation, New York 1959, pp. 5, 12–13.
71. Op. cit. note 17, p. 12; Op. cit. note 13.
72. Op. cit. note 11, p. 75–77.
73. Ibid., pp. 76–77.
74. According to Clausewitz (p. 113) “The novice cannot pass through these layers of increasing intensity of danger without sensing that here ideas are governed by other factors, that the light of reason is refracted in a manner quite different from that which is normal in academic speculation”. From this phrase we have formed the expression “the refractive error of reason” to refer to the effects of friction.
75. Here it is referred to the U. S. Army concept of “Situational Understanding”. It is the product of applying analysis and judgment to relevant information, to determine the relationships among the mission variables to facilitate decision-making.
76. Op. cit. note 11, p. 139.
77. See: Vegetius, Flavius: *The Military Institutions of the Romans (Epitoma rei militaris, 390 A. D.)*, edition 1940.
78. Borell, Klas: *Disciplinära strategier. En historiesociologisk studie av det professionella militärdisciplinära tankesättet 1901–1978*, Almqvist International, Uppsala 1989, pp. 8–12.
79. FM 3-0, 5-3. Some kinds of notions can, naturally, be found in any regular army field manuals or other training manual (e.g. close order manuals).
80. Op. cit. note 78, pp. 8–12.
81. Mällki, Juha: *Herrat, jätkät ja sotataito. Kansalaissotilas- ja ammattisotilasarmeijan rakentuminen 1920- ja 1930-luvulla ”talvisodan ihmeeksi”*, Finnish Literature Society, Helsinki 2008. (Gentlemen, Lads and the Art of War. The Construction of Citizen Soldier and Professional Soldier Armies into “the Miracle of the Winter War” during the 1920s and 1930s), Summary, pp. 358–362. This study was based on analysing the oral historical sources that had mainly been produced by the veterans of Second World War. The observations were compared to U. S. Military sociological observations (Stouffer et.al.: *The American Soldier. Adjustment During Army Life*, Volume I. Science Editions, John Wiley & Sons, Inc., New York, Kansas 1965).