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Improving Time-Critical Decision Making in Life-Threatening Situations: Observations and Insights

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In this article we present our concept of time-critical decision making, sometimes even in life-threatening situations, and compare it to the process of non-time-critical decision making. Decision-making methodologies have been extensively researched, and some of the published research deals with decision making within the context of everyday life. However, in many organizations it is customary for decisions to be made under pressure and in conditions of uncertainty. Such organizations may benefit from a generic decision-making approach. Two case studies were used to research the characteristics of time-critical decision making. A qualitative analysis of these case studies and previous research insights were integrated. The insights that were found enable us to offer a practical generic approach toward improving the process of time-critical decision making. The suggested approach combines components that were mentioned in previous research with new ones. It contains two phases: The first identifies various decision-making situations in the organization and their classification according to the extent (severity) of time criticality in making and implementing the decision. This classification determines the necessary decision making and implementation procedures, whether they are cognitive or not. The second deals with the relevant components for improving the quality of the decision making. Application of this approach is very simple, and it suits not only military organizations, but also organizations and individuals that will benefit from making better decisions in stressful situations. The approach can be combined with other existing approaches such as risk management.

Key words: naturalistic decision making; decision analysis; time pressure
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1. Introduction

Everyday life requires us to make numerous private and professional decisions. Decision-making methodologies have been extensively researched. Published research deals with different components of time-critical and non-time-critical decision making. In many organizations it is customary to make time-critical decisions in conditions of uncertainty. We believe that the topic of stressful decision making in general, and in time-critical conditions specifically, is worthy of serious consideration, especially because we are not familiar with a systematic and generic method for improving the quality of such decisions. Moreover, naturalistic decision-making (NDM) literature argues that: (1) there is a need to research real-life issues and develop strategies to cope with stressors while maintaining good performance (e.g., Hockey 1986); (2) because real-life cases of stressful decision making are rare, and when they do occur the stakes are often too high to intervene, it is therefore of great importance to research such cases whenever possible, and draw conclusions (Baumann et al. 2001).

In this article we present our concept of time-critical decision making, sometimes even in life-threatening situations, and compare it to the process of non-time-critical decision making. We also demonstrate the effect of the decision maker's personality on the outcome. Two case studies were used to research the characteristics of decision making under extreme conditions of time and life-threatening situations. We examine findings obtained from this analysis and conclude with a new and generic approach toward

improving the process of decision making under time pressure, and offer suggestions for future treatment and analysis.

2. Decision Making: Definition and Some Common Approaches

We define *decision making* as a psychological process in which the decision maker chooses between various alternatives with the intent of reaching a maximal number of goals, while avoiding damage and unnecessary risks, and by using a minimal amount of resources (Heichal 1992). This definition, unlike others, focuses on the psychological components of the decision-making process, and highlights the fact that most decision makers act in uncertain and complex environments. Such uncertainty is an inherent result of the lack of information with regard to the scope of the decision, and the probability of the occurrence of various results reached by making a specific decision.

It is possible to differentiate between various levels of decision making. At the highest level, the decision-making process is cognitive and systematic, whereas at the lower levels the cognitive component is reduced to a point whereby decisions are made without engaging a cognitive process, and at times are even made automatically (Zakay 2004). All the levels noted above play a significant role in the process of decision making where their relative importance may change in accordance with a given situation and the personality traits of the decision maker—these aspects will be explored later (Cohen 2004).

The systematic, cognitive process of decision making contains several steps (Gal 1991):

(1) Defining the goals that have to be achieved,

(2) A thorough examination of all possible alternatives prior to the decision,

(3) A consideration of the cost and benefits resulting from the various decisions,

(4) A systematic search for new information that will help to evaluate the various alternatives,

(5) An evaluation of the new information (even if it contradicts the chosen alternative),

(6) A repeated examination of the various outcomes of each alternative before making a decision, and

(7) Once a decision has been made, all the necessary preparations must be made to enable its implementation.

Value-focused thinking (Keeney 1998, p. 6) promotes the development of new alternatives, for step 2. Keeney describes the above-mentioned decision process—an alternative-focused thinking. He argues that when facing a decision problem (p. 49), it would be very beneficial for the decision maker to think hard and to explore and create decision alternatives that may otherwise be out of sight.

Another degree of freedom that typically accompanies a systematic decision-making process is the relative flexibility regarding the timing of our actual decisions. By choosing the right time to decide, we may improve our decisions. Such an approach was presented by Keeney and Raiffa (1976), who termed it *time resolution of uncertainty*, whereby the decision maker must choose between alternatives (potential decisions) that will eventually result in a time stream of consequences, subject to a time stream of uncertain events. We may assume that some decisions either can be made immediately or postponed to a later time. Immediate decisions have two advantages: Uncertainties are resolved at an early stage and so we no longer have to worry about them; and if there is a difference between the time of resolution and the actual time of the consequences, we can prepare ourselves to apply the decisions in the best possible way. However, immediate decisions suffer from a basic inadequacy; they are usually based on an imperfect knowledge of the future. Where there are delayed decisions there are fewer gaps in information, and so there is an improved perception of the future objective value. Keeney and Raiffa (1976), state that considerable uncertainty about future preferences for consequences, as well as about the consequences themselves, increases the importance of providing more flexibility in designing strategies and making decisions. It is important to note that decision making in a stressful environment, whether decisions are immediate or postponed, usually suffers from other inherent inadequacies: uncertainty and imperfect information of the present.

Another problem to be considered is the question of how to determine if a decision is a good one. A simple answer is to define a good decision as one that

brings about good results. Nevertheless, the quality of the decision-making process is also a parameter that may affect the definition of a decision. Specifically, it is possible that a decision that caused poor results, by no fault of the decision maker, could be determined a good decision if it was made via a high-quality process (e.g., a systematic decision-making process that follows all the regular steps). Such an example is given by Clemen (1995). He demonstrates that the same decision would have achieved opposite outcomes if it was made at different times (pp. 3–10).

It is important to note that all decision-making strategies that we mentioned so far assume that decisions are made in a rational, systematic, logical, and orderly fashion. In the military reality to which we relate in this article, decisions are made under time critical conditions, uncertainty, and in many cases life-threatening situations. Under such conditions the decision-making process must be altered; this we will explain shortly.

3. Attitudes Toward Risk and Their Influence on Decision Making

A common definition of risk is: a combination of the probability of an unfavorable event, and the consequences of that event to a mission's success or system's performance (Shtub et al. 2005).

Managers' attitudes toward risk affect their decision-making pattern. It is common to distinguish between the three basic attitudes: risk-averse, risk-neutral, and risk-prone (Keeney and Raiffa 1976). Intuitively, a layperson would think of a risk-averse person as one who prefers to behave conservatively. Conversely, risk-prone people are seen to go through life looking for the "big opportunity." The intermediate case is that of a risk-neutral person who assesses the consequences at their face value. Deitch's research into the U.S.A.F (United States Air Force) pilots who were characterized as risk prone established a link between their attitudes toward risk and a decision-making pattern that caused flying accidents (Deitch 2001).

It is possible to exhibit a mixture of these kinds of behavior: A decision maker might be risk neutral when the decisions at stake are insignificant, then turn to be risk averse when considering significant decisions. Shtub et al. (2005) demonstrate, through an illustrative example of a project selection problem, that decision makers with different risk attitudes make different decisions when facing the same problem.

4. Time-Critical Decision Making

Time criticality is one of the characteristics that differentiates between "ordinary" decision making and decisions made during intense stress, such as in a state of emergency. This difference has a significant influence on the way decisions are made. It is important to note that time criticality and stress are subjective states. When experiencing a time-critical, intense decision-making situation, an individual would feel that the situation is complex, information is incomplete, time is short, there is a real threat, and failure consequences are extreme (Hockey 1986, Baumann et al. 2001).

Some of the research points out the differences between a time-critical decision-making process and a non-time-critical one (e.g., cognitive decision making)—here are some of the main differences (Baumann et al. 2001, Endsley 1995, Zakay 1993, Gal 1991):

(1) Decreased effort is spent in identifying and investigating various decision alternatives.

(2) There is an exaggerated influence of negative information (e.g., an alternative decision might be rejected based on information that normally would not have been considered as significant).

(3) Conversely, important information might be disregarded or denied.

(4) There is an increased tendency towards automatic decision making (Hockey 1986) while using "intuition-based" satisficinglike approaches (Simon 1979, Ignizio 1982) or heuristic approaches.

(5) The number of mistakes might increase dramatically even in relatively simple situations (e.g., in assessing a situation, in evaluating pertinent data, and by forgetting important data).

It is important to point out that the ability to deal with a stressful situation is directly influenced by the decision maker's subjective perception of its severity. Two different persons might evaluate the same situation differently: One may perceive it as a stressful situation, whereas the other might see it as a challenge and an opportunity. Accordingly, the quality of

decision making may be different: The latter's performance is expected to be superior as his decision-making process is less influenced by stress. Deitch presented an example of such a situation by comparing decisions made by inexperienced and experienced pilots. He pointed out that the latter make better decisions due to their ability to perceive a situation as less stressful (Deitch 2001).

It can be concluded that making good decisions necessitates using a methodical process based on the steps discussed earlier (although it is worth noting that completing it does not automatically make it a "good decision"). It is only natural that under stressful conditions it is hard to execute a complete methodical process; therefore, as the time criticality increases, we may expect a reduction in the quality of the decisions.

Nevertheless, there are several influential factors that may affect the quality of different individuals' decision making:

(1) Their ability to cope with stress and so to implement a methodical decision-making process,

(2) Their subjective assessment of the gravity of the situation, and

(3) Personality factors such as the attitude toward risk and previous experience under similar conditions.

5. Two Case Studies of Time-Critical Decision Making in Life-Threatening Situations

In this section we present two examples of real military situations in which decisions were made under pressure of time and in mortal danger. The first case study discusses an aviation emergency decision-making process and the second one deals with medical decision making. These specific cases were chosen because it was found that medical and aviation emergency decision making may be relevant to each other (Salas and Klein 2001). Therefore, our main focus is on the insights gained by analyzing the decision-making process in each case. Our research methodology is based on the naturalistic approach to decision making (NDM), developed and described by Klein (1993a, b), Klein and Woods (1993), and Zsambok and Klein (1997). This approach applies to stressful, time-critical decision making as in military missions and in medical emergency situations. We used a prepared questionnaire to investigate the decision makers with regard to the particular example, and also conducted interviews to learn about the nature of their personalities and decision-making patterns (see appendix).

Clearly, no statistically significant conclusions can be based on two examples. We believe, however, that they serve to illustrate the decision-making mechanism under the specified conditions. We can therefore analyze this process to correlate it with findings of previous research and to offer general insights that will work towards its improvement. Moreover, it is clearly stated in the NDM literature (e.g., Baumann et al. 2001, Hockey 1986) that it is very important to mention and analyze real examples and provide insights because situations involving real stress occur rarely in the real world.

Case Study 1: A Successful Ejection from a Fighter Airplane

Upon completing a routine practice of air-to-air fighting, a fighter airplane flown by a pilot and a navigator was due to land at its base. The pilot had started the landing procedure and let down the landing gear. At this time, everything was going in accordance with the routine procedure. The plane touched down and wheeled along the runway for about 10 seconds. The pilot was about to lift the plane's nose to perform routine aerodynamic braking, and hence speed reduction, when he felt that the plane was pulling to the right. Later it was established that the right-hand landing gear had buckled and caused the plane to collapse on its right wing, a fact that the pilot did not realize at the time. The pilot's reports indicate that he had tried to gain control of the plane and had also released a hook that should have helped stop the plane by being caught by a stopping cable that spans the runway (afterwards an inquiry established that the brake hook had not been released). The pilot observed that his speed was about 140 knots. He knew that the end of the runway was fast approaching and the airplane was about to skid off and overturn. At this point he pulled on the eject handle, thus ejecting himself and the navigator from the plane. The airplane continued, and finally stopped upside down with a crashed cockpit. Throughout the ordeal, the navigator felt that something was wrong; however, he played no part in

making the decision to eject from the plane due to the short time span (estimated by the pilot to have lasted approximately five seconds) between the failure of the right-hand landing gear and the actual ejection.

It is important to note that ejection from a plane is a very traumatic event for pilots. It is one of the decisions that all pilots hope they will never have to make. In the split second before the pilot pulled the eject handle, he felt a variety of emotions: doubt, by questioning the necessity to eject, and guilt, for ejecting the navigator without having warned him beforehand.

As additional background information, it is important to note that the pilot was well trained and had a great deal of experience in the same squadron. His training included familiarity with the squadron policy in unexpected situations, including practicing rules of thumb and preliminary decisions for emergency situations. The policy states that an ejection procedure must be initiated when a plane's speed exceeds 50 knots near the end of the runway. The pilot's actions conformed to the specifications of this policy.

A flight simulator that enables pilots to experience extreme situations and to practice appropriate responses was used in part of the pilot's training. However, the pilot had seldom practiced situations in which ejection near the end of the runway was necessary.

In this case we classified the decision made by the pilot as automatic. It was merely the result of an existing policy (i.e., to eject from a plane in an emergency if its speed exceeds 50 knots near the end of the runway) once the situation was identified as complying with the policy. The execution of the decision to pull the ejection handle was also automatic—a result of continuous practice until it became second nature. Despite this training, he reported that during the split second before the ejection from the plane, he was preoccupied with the dilemma of whether or not to eject, hoping that he might manage to keep the plane on the runway and prevent it from overturning.

Some of the typical components that differentiate decision making under pressure from ordinary decision making are taking automatic action and the subsequent uncertainty with regard to the action that was taken. The pilot was sure that he had pulled the brake hook, but it was later discovered that he had not.

We analyzed the pilot's personality regarding risk taking and found him to be within the range of a risk-neutral to a risk-prone person. It is possible that a risk-averse person would have made the wrong decision by trying to keep the plane on the runway, and so would have endangered himself and the navigator.

A general insight can be gained from analyzing this case. It is important to recognize early on (by means of a methodical routine) situations in which there is no time to make a cognitive decision. Thereafter, a set of preliminary decisions needs to be determined for each situation, and its execution should be practiced repeatedly with the aim of reaching a point when the "right decision" would be made and executed automatically. An additional value of such practice is that it improves the subjective perception within a given situation. In this case study the component of a preliminary decision was present and manifested by the pilot automatically pulling the ejection handle. More specifically, these findings emphasize the need for pilots to practice emergency situations when nearing the runway. It is particularly important to analyze this successful time-critical decision-making process in the face of many examples noted in the aviation safety literature that record errors resulting either from a faulty identification of the current situation (e.g., Orasanu et al. 1993) or from making and implementing a faulty decision, sometimes even when information is extensive (e.g., NTSB 1985).

Case Study 2: Treatment of an Injured Soldier

A message from a frontline outpost reported that a mortar attack had caused a number of injuries. The battalion doctor, a reservist stationed nearby, was summoned and arrived immediately at the outpost. The division's doctor, who was stationed in the area, also decided to go to the outpost to help; he himself almost took a direct hit when he arrived during the attack. Upon arrival he assessed the situation. There were three injured soldiers in the outpost. Two had sustained minor injuries, whereas the third had suffered serious injuries and was being treated by the battalion's doctor. Although the third soldier had no pulse and was not breathing, the doctor tried to intubate (insert a tube via the air passages) the soldier five times, but to no avail. The medical corps'

policy demands a coniotomy (a surgical procedure that opens the trachea), after three failed intubations. However, very few doctors have actually practiced a coniotomy, and so the division's doctor hesitated to perform a coniotomy (he had only practiced this procedure during his medical studies—on a dog). In the meantime he decided to examine the state of the trachea with a laryngoscope (a medical instrument that has a light attached to it and which is inserted through the mouth into the trachea). He observed an oedematous area in the laryngopharynx which was preventing air from passing from the windpipe to the lungs, and so only then decided to perform a coniotomy. Despite his lack of experience, and the added pressure from the enemy attack, the execution of the procedure was unexpectedly not too complicated, and would have opened the air passage to the patient's lungs. As we analyzed the doctor's personality regarding risk taking, we found him to be risk neutral, and that his hesitation to perform a coniotomy was only due to his lack of experience in that specific field (as is reasonable to expect when treating a person whose life is on the line). However, despite all the effort, the soldier was pronounced dead.

This case study differs from the first one because the decision-making process was cognitive. An initial examination of the trachea was performed prior to making a decision. Based on the examination, two alternatives became available: to try once more to intubate the patient or to immediately perform a coniotomy. The decision to perform a coniotomy was based on a cognitive process—quite different from the automatic decision made in the first case. However, one may surmise that if the two doctors had more experience in the performance of a coniotomy, they would have made an automatic and quicker decision.

One might deduce from this case that even if the correct operating policy exists, it is not enough. Lack of experience in implementing decisions stemming from such a policy might deter their realization. It is very important to identify all the components of such an implementation that the decision maker might encounter. It is imperative to train the decision makers in such a way as to instill confidence in their ability to execute decisions.

This insight should focus on and examine procedures that a military surgeon encounters; identify those where prior experience has been insufficient (for instance those procedures that are not taught during years of study nor are they practiced in hospitals); and drill them, thus inculcating the necessary experience.

The medical corps found a partial solution. They use paramedics in combat situations. These paramedics serve one week each month in emergency ambulance units in the cities and experience life-saving activities firsthand, thus honing their own life-saving skills.

6. The Challenge—Improving the Quality of Time-Critical Decision Making in Life-Threatening Situations

This section presents our suggestions for improving time-critical decision making in life-threatening situations, and is based upon our previous research and analysis. They focus on the influencing factors: the ability to cope and to perform a methodical process of decision making under pressure; the subjective assessment of the situation; and personality attributes. We shall illustrate these by bringing some examples from areas familiar to the author. However, the suggestions pertain to any professional field that corresponds with our setting.

Later we present a two-phased approach for improving the quality of decisions: (1) identification and classification of the decision-making procedures within the organization and (2) dealing with all types of decisions.

Suggestions for Dealing with the Influencing Factors

Factor 1: *The ability to cope with and to perform a methodical process of decision making under pressure.*

(1) Improving the knowledge base by introducing learning habits—It is very important that the decision maker will acquire a substantial knowledge base in his operating area. Air force pilots, for example, go through a long training process as part of their flying course. During this time they learn everything about both aviation and the aircraft, to be as well informed as possible and to improve their overall awareness. The same method is applicable in medical training. It is customary to widen the general basis of medical knowledge for all medical students regardless of their

specific fields of medical specialization. Understanding the general basic procedures is an inseparable part of the expertise of the medical profession.

(2) Policy and procedures, based on the experience of others, are intended to assist the decision maker to make the right decision automatically. Previous research in settings similar to ours demonstrated the usefulness of identifying patterns and mapped them into standard responses and procedures (e.g., Freeman and Cohen 1996). This is demonstrated in aviation, for instance, where for each specific aircraft small pocketsize booklets are handed out to the pilots. The booklets contain detailed information about vital safety checks. Each pilot learns by heart the entire set of checklists, which contain several subjects: The first contains specific data about the limitations of the relevant aircraft; the second itemizes engine-starting procedures and safety checks for the various stages of the flight; the third lists various aircraft malfunctions and what they mean, as well as enumerating additional tools for analyzing these malfunctions, and the necessary actions that need to be taken to correct such malfunctions in order to keep the aircraft and its passengers safe; and the fourth addresses emergency procedures in which the decision maker must decide which action to take in a specific emergency—starting with a forced landing, and listing additional possibilities such as an early landing, immediate landing, and returning to the airport of departure. In addition, in operating both military and civilian aircraft, there is a compilation of procedures in which the intent of the major decision maker (the manager or the commander of the aircraft) is elucidated. In this document the intent and experience of the major decision maker concerning the optimal way to act in a given situation, in which there are no explicit guidelines regarding the correct and required way to act, are clearly defined—for example, in cases when failures occur that are not listed in the safety check booklets.

The policy and procedures' process bases many such definitions on the debriefing sessions and analysis of actions taken. In military air forces, for instance, a thorough briefing is performed prior to any significant mission, during which the immediate decisions for all possible eventualities are enumerated. At the conclusion of the mission a debriefing session is held with the aim of drawing conclusions and learning from the actions of the participants.

(3) Changing the decision-making process from cognitive to automatic—the goal of this procedure is to promote fast decision making, and the prompt implementation of the decision to the point that it becomes an automatic response that is executed without delay, even in extreme situations (Yates 2001). The flaw in this process is the possibility of jeopardizing cognitive deliberation and therefore leading to incongruity between the decision and the situation. Both the aviation industry and the medical profession reach this automatic response by using advanced training tools, namely simulators. The flight simulator replicates virtual situations to best train the pilot to cope with in-flight emergencies. Doctors' training is done on lifelike dolls that simulate emergency health conditions. The dolls are programmed to such a high level of sophistication that they react to the treatment given by the attending doctor. The simulator has two functions: The first is to introduce the trainee to situations that are not readily available either due to the lack of technical resources, or the probability of them being dangerous, and so train him or her to react appropriately in such situations; the second is the constant repetition of immediate reactions, which constitute a realization of decisions (at times they might be on-going decisions), and by so doing, reaching a point where the reactions become automatic.

(4) Examining the situation from a distance and offering advice without experiencing the real intensity of the pressure—advanced technology, combined with command and control capabilities, allow the senior decision maker or the professional counselor who has a great deal of experience and information, to help with decision making from a command or control post, without actually experiencing the full and actual pressure of the situation. Previous research (Crocoll and Coury 1990, Hutchins and Westra 1995) showed that decision support tools may help to reduce the number of decision-making errors in stressful situations.

Factor 2: *The subjective perception of the severity of the situation.*

(1) Simulation of stressful situations—the use of simulators is widespread in aviation (Salas et al. 1998). It is aimed at instilling self-assurance in the decision maker, thus enabling him to perceive the true nature of the situation, and enabling him to approach

it in a methodical way. In this context, it is important to note that the quality of the simulation and the frequency of the practice, due to the effects of learning and forgetting, are of great importance. The practice of stressful situations can be carried out using a simulator, or in simulated real-life situations by exposing the decision maker to an event that is as similar as possible to the real situation he will have to confront. An experienced trainer who is present at the practice sessions might be very influential in greatly improving their results.

(2) Experience under actual stress conditions—this component is very significant in improving subjective perception and the ability to make decisions under pressure. It is reported that task experience should lead to an increase in ability and a decrease in uncertainty (e.g., Radhakrishnan et al. 1996). Therefore, we recommend that it should be given additional importance. It can be surmised that the experienced commander who has had his baptism by fire will perceive the situation in a more realistic fashion than his inexperienced counterpart.

(3) Mental preparation—in our opinion this component may prove to be one of the most important components in training the decision maker to do what is required of him while under pressure. The mental preparation must be adjusted to the specific person and the specific situation. Previous experience shows that mental preparation before a dangerous mission might reduce the stress level, and in this way improve the decision-making process. Such mental preparation is aimed at enhancing the decision maker's own beliefs regarding the probability of successfully accomplishing the mission and by that to have a positive effect on performance (Baumann et al. 2001).

Factor 3: *Personality traits*.

(1) Attitudes toward risk—for certain positions that involve making crucial decisions that might endanger human life, it is recommended that a prior assessment should be made with regard to the intended decision maker's attitudes toward risk taking. Such an assessment might disqualify candidates from certain tasks, and in other cases provide important information that might have an influence on the specific training process chosen for the intended decision maker. The diagnostic model must be constructed by professional experts.

(2) Prior assessment regarding the aptitude for making decisions under pressure—we recommend the development of a diagnostic model that will facilitate the classification of the decision-making abilities of those who will work under extreme conditions of pressure.

7. A Method for Classifying Essential Decisions and Improving Their Quality

In this section we integrate the procedures and insights that were detailed into a two-phased approach aimed at identifying, classifying, and improving the procedures of time-critical decision making.

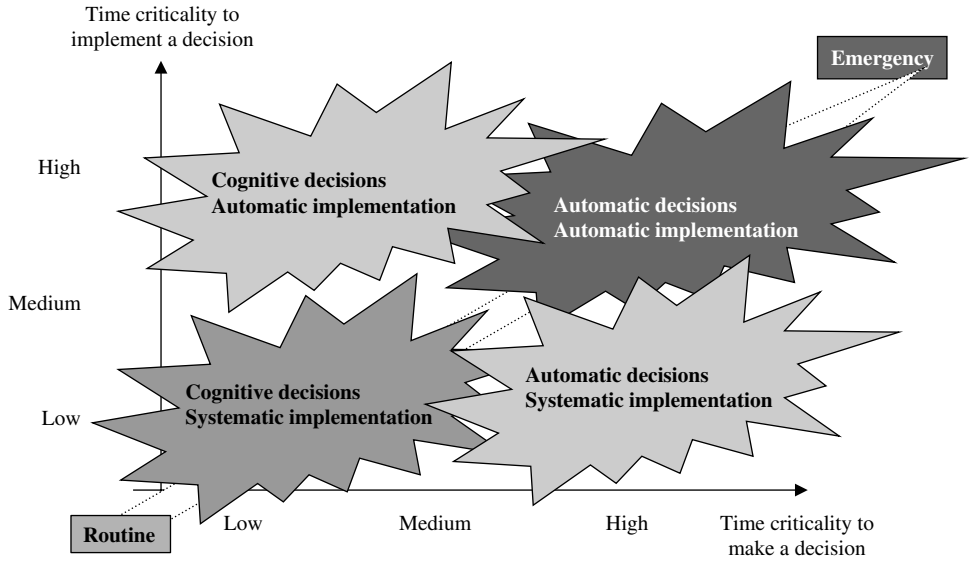
The first phase requires a survey and categorization of decisions that might be made; the latter would be according to the degree of time criticality for making and then implementing the decision (that is, decisions that have to be made and implemented immediately or decisions that have to be made immediately but may be implemented at a later time, and so on). The second phase involves determining whether or not the different factors that might improve the quality of the decisions were dealt with as we discussed in earlier sections of this article.

Figure 1 suggests a classification system of procedures for making and implementing decisions with respect to the varying degrees of time criticality. The trade-off is that the quality of decisions and their implementation increases as the decision maker uses cognitive, methodical, and systematic processes as were described before in the paper (i.e., such procedures are recommended for any situation in which they would be applicable), but as the time criticality increases, the ability to make decisions according to such processes decreases. Therefore, as the time criticality increases, decisions and their implementation are usually of an inferior quality compared to the methodical processes. In Table 1 we summarize the insights and the recommendations presented in this article.

8. Summary

This article presents a new approach to improving time-critical decision making. This approach combines components that were mentioned in previous research, as well as new ones, such as analyz-

Figure 1 A Classification System of Procedures for Making and Implementing Decisions with Respect to the Various Degrees of Time Criticality



ing decisions and their implementation separately. It consists of two phases: The first identifies various decision-making situations in the organization and their classification according to the extent (severity) of time criticality to take the decision and then to implement it. This classification determines the necessary decision-making and implementation procedures, whether they are cognitive or not. The second deals with the relevant components for improving the quality of the decision making. We identified three relevant components: (1) the ability to cope with and to perform a methodical process of decision making under pressure; (2) the subjective perception of the severity of the situation; and (3) the personality traits of the decision maker. We suggested a practical means for dealing with each one of these components.

Table 1 A Summary of Decision-Making Classification and Recommendations for Improvement

Classification of decisions	Main recommendations	Examples
Cognitive decisions-systematic implementation	Methodical and systematic process	Administrative work-routine decision making
Cognitive decisions-automatic implementation	Prior identification and classification of the ability to function under stress; training the decision maker by providing a wide knowledge base, policies and procedures Turning implementation into automatic by practicing stressful situations, and most favorably, experiencing actual stress situations	Emergency medical situations
Automatic decisions-systematic implementation	Prior identification and classification of the ability to function under stress; decision-supportive policy and procedures; a great deal of training and first-hand experience of stressful situations; using a function that examines the situation from a distance; mental preparation before a mission	Complex situations in which the first decision is made instantly, but the implementation requires additional decisions. For example: deciding to execute a rescue mission of friendly forces behind enemy lines
Automatic decisions-automatic implementation	It is crucial to identify the ability to function under stress and the attitude toward risk by using decision-supporting policy and procedures. A great deal of training until decision making and implementation become automatic	Emergency situations in aircraft landing

The implementation of this approach offers the possibility of making better decisions in organizations that are exposed to stressful situations, and may be combined with other existing approaches such as risk management (which are not discussed in this article).

As the subject of decision making in general, and under time-critical conditions in particular, is of paramount importance in various organizations, it is advisable that future research directions should include the examination of additional stress components (for example, danger to human life and peer pressure), and their influence on the process of decision making.

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Appendix. The Questionnaire That Was Presented to the Decision Makers in the Case Studies

1. **Describe the event**
2. **Prior to the event:**

a. Describe prior knowledge and tools that helped you to make the decision.

b. Did these tools lead to full/relevant solutions?

3. **During the event:**

a. What data did you receive, and how did the decision-making process take shape?

b. Describe the different steps taken in making the decision.

c. Was there teamwork in making the decision, and were you helped by outside sources?

4. **After the event:**

a. Describe your insights regarding time-critical decision making (personal and within a team).

b. Detail suggestions for improving time-critical decision making.

5. **Personality traits:**

a. Would you describe yourself as risk-prone, risk-neutral, or risk-averse?

b. Would this description have changed as a function of the decision consequences (in monetary value or in human life)?

c. Would your decision-making process have changed if you had more/less time, and if so, how?

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