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WHAT HAPPENS AT THE FIRE SCENE? IS THERE A CLASSICAL DECISION MAKING OR TOTALY DIFFERENT PROCEDURES ARE USED?

Abstract: During fighting against forest fires the situation can change quickly, thus, managers must also be ready to change the strategy and tactics. Trainings usually focus on traditional – analytically based – decision making, which takes time. However, in many cases there is not enough time to do that. The author used different tools and methods to achieve his goals; one of them was the study of the relevant literature, the other was his own experience as a firefighting manager. Other results come from two surveys made by the author. One simple and another complex model were created by the author for firefighting managers making decisions, taking into account time pressure, the limited capability of processing information and also a mechanism complementing the recognition-primed decision.

Key words: decision making, RPD, fire managers, model for making decisions in emergencies

ШТА СЕ ДЕШАВА НА МЕСТУ ПОЖАРА? ДОНОСИМО ЛИ КЛАСИЧНЕ ОДЛУКЕ ИЛИ КОРИСТИМО САСВИМ ДРУГАЧИЈЕ МЕТОДЕ?

Резиме: Приликом гашења пожара, ситуација се веома брзо мења, зато вођа гашења мора бити спреман да промени стратегију и тактику гашења. Током обуке се фокусирамо на практичне и класичне методе и методологију које су временски доста захтевне, али у пракси нема довољно времена за доношење таквих одлука. Аутор је користио више научних радова и тако проучавао стручну литературу, користио сопствено искуство, односно резултате ранијих анкета. Аутор је поставио један једноставан и један комплексан модел ситуације у којима се налази руководилац гашења, и узео је у обзир да се одлуке доносе веома брзо због недостатка времена.

Кључне речи: доношење одлука, хитно доношење одлука, гашење пожара, вођа гашења пожара, одлуке зависне од метода детекције

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1. INTRODUCTION

The background of recognition of a special decision-making mechanism in the focus of this paper was given that, in some cases, no sufficient time is available, necessary for classic decision-making. Therefore, strategists sought to design and plan the details of military operations in advance, just as today, however, their proper implementation, the application of different decision support instruments in live situations, designed for optimal decisions, failed many times in spite of these. Decisions made in reality are often not harmonized, could not be harmonized, considering the circumstances, with the pre-formulated strategies, mostly because there was not enough time needed to achieve them.

2. CIRCUMSTANCES OF EMERGENCY INTERVENTIONS

An important element of the activities of emergency responders is that they cannot or only to a very limited extent can modify the terms of the task, improve them as desired. Despite the differences of environment, indications of the complexity of the situation, the possibility of the radical change in the given situation, uncertainty and ambiguity of the information available can be recognized and well identified.

The peculiarities of each specialized branch can be illustrated through the examples of several authors: Klein dealt with the analysis of the decision circumstances of the military also using the examples of firefighters [1], Killion took examples from the navy [2] Bruce shows his own medical case [3], Johansen simplifies difficult circumstances [4]. Others focus on medical rescue problems in military field [5] [6] or examining fires in different dimensions to find solution from the side of fire prevention to reduce the risk of intervention [7] [8] or help making decision in special buildings [9] [10].

The extinction of fire in a smaller grass land requires the implementation of a completely different, simpler scope of tasks than to control forest fire in an extra dry weather period and high articulated area. The different scopes of tasks exist in different environments and structures, so the solution of similar basic problem also exists in other dimensions. Based on author's own experience, the more extensive case we are dealing with in time, space and from the aspect of involvement in the incident, the more the above factors cumulatively prevail, but because of the protracted implementation, it is, however, easier to solve them.

3. GENERAL MODEL OF RECOGNITION-PRIMED DECISIONS

The above proves that, in certain situations, the multi-criteria, analyzing, evaluating decision-making simply cannot be used or in a limited manner. However, it can be seen that managers, directors or commanders are many times in situations that they simply cannot elude from their decisions; they should make them in a short time. The functional background of decisions made in a short time, their mechanism different from the conventional was first studied in depth by Klein, who gave the name recognition-primed decision to this special decision procedure [1].

Supplementing the general model with the assessment of action versions, we receive the model of analysis of possibilities [2]. In this case, if the action version is not satisfactory, a new action version will be modified or assessed. If the decision-maker has a significantly longer time to assess his concepts, naturally within the framework offered by a recognition-primed decision, there is the possibility to assess on the level of critical analysis [11], or according to options characterizing analogical thinking [2].

Recognition-primed decisions do not exclude the possibility to amalgamate conventional, analyzing decision-making [2] [12]. At complex tasks, where a given situation is examined from several aspects – and choose from the options with analogical thinking – recognition-primed decision-making can be automatically applied by experienced decision-makers while solving some partial tasks to reduce the time of the decision process.

The above issues harmonize with the observation that decision-makers simplify complex problems, i.e. create partial problems, until the elements broken down become manageable and resolvable [13] [14]. By enlarging its interpretation range, of course, we can reach the point where the decision-maker may say the problem does not exist until he sees its solution [15], or the problem does not exist at all if it does not have a solution [16]. Many times we can see that forest fire managers come face to face with fire and without any time of thinking they are able to give instructions immediately. We say, routine works but it means they use schemes rather than making ad-hoc decision.

It springs forth from the above that the relative position of multi-aspect decision-making and recognition-primed decision-making is not constant. Recognition-primed decision can be the partial process and decision unit of analogical thinking. In this case, the main decision-making mechanism is analogical thinking; recognition-primed decision is the additional element.

4. DECISION-MAKING MECHANISM OF A FIREFIGHTING MANAGER

Limited time frame allows the elaboration and management of limited amount of information. We know from Miller's researches that the short-term memory of the vast majority of people can only process simultaneously 7 ± 2 units of information [17]. This information, of course, can be quite different, e.g. a characteristics of fire, the capacity of the response unit, a number, or even the absence of information searched. Our memory handles the combinations, "operations" between the information units as information units [16], from which clearly springs forth that the capacity of the short-term memory of a firefighting manager is exhausted very quickly.

Author has proven by essay analysis how complex the tasks of emergency responders are [18]; this shows that in several cases, simultaneously, there is or would be a need to process many more units of information than the capacity of our short-term memory would allow. The maintenance of our decision-making capability, i.e. our short-term memory, based on the above, clearly requires that we should omit analyzing and evaluating decision-making processes protracted and use the recognition-primed decision-making procedure, based on previous experience.

Author wishes to create a model element to demonstrate the decision-making mechanism of firefighting managers, which takes into account the limits of the simultaneous processing of information, that is, it also illustrates Miller's decision-making capacity. Since the information units may be qualitatively independent of each other, author choses the simplest graphical representation of the unit-based discrete difference to separate them from each other. A model element must be such, which can graphically demonstrate the schemes based on earlier experience, the characteristics of different fires, and the interlocking of the former as the application of the scheme, which represents the technically correct solution of the task, i.e. effective decision. The model refers, at the general model of recognition-primed decisions, mostly to Klein's work [1] [19].

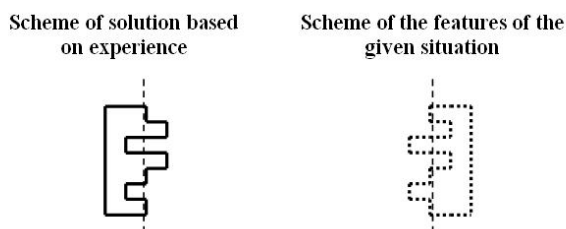


Figure 1. Graphic representation of the empiric scheme of recognition-primed decisions matching a given situation. Source: author

The schemes in figure 1 represent 7 graphical discrete values each, which are marked by positive or negative protrusions and their "center line"; these values indicate the amount of simultaneous decision-making capacity. Thus, the "negatives" of the schemes can be matched as a given situation and the solution necessary therefor. As an integration of above processes, decision mechanism functions as follows: an experienced firefighter has performed the elimination of a large number of and forest fires. Despite the fact that as far as the parameters each forest fire is different from another, some characterizing features can be well conceived (figure 2).

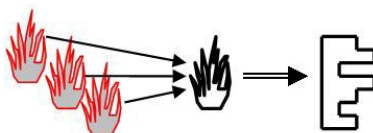


Figure 2. Evolvement of the scheme on forest fire. Source: author

The characterizing features of identical types of fires are crystallized by experience, and are fixed in our long-term memory. Similarly, to the characteristics of a forest fire, the characteristics of successful extinguishing, the facilitating decisions are also fixed (figure 3); just as the mistakes desired to be avoided and the unsuccessful procedures and failures. Experience gained through many years, based on the features of forest fires, formulate the

system of schemes, behind which we can find actions (decisions) efficiently applicable to eliminate them.

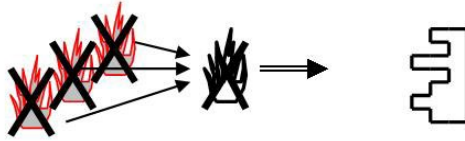


Figure 3. Evolution of the scheme on the lessons learnt from extinguishing a fire. Source: author

If another incident has almost the same circumstances as one already many times successfully eliminated by a firefighting manager previously (model of positive confirmation), he will attempt to use the same ones in the procedures. Therefore, another fire, quasi bearing the typified properties of previous similar fires, a decision-maker involuntarily immediately recalls the typified decisions in his conscience. The properties of a fire and of previous successful extinguishing operations, based on the above, are closely interlinked; they are each other's "reflections" (figure 4). Author proved with the results of association studies that the above, i.e. the characteristics of a fire and the thoughts directed towards its extinguishing, the schemes of response, in the case of firefighters, are very closely connected in a complex way [18].

When a firefighting manager identifies a fire, he imagines what would happen if he applies the usual tactics to fight it. If the scheme of solution matches, he accepts it, if not, he rejects it and thinks of the next most typical action. Thus, it is a recognition-primed, model-matching process, which can be followed by a quick and almost automatic decision. The above process is naturally not limited only to forest fire managers; it can be used more broadly to firefighting managers.

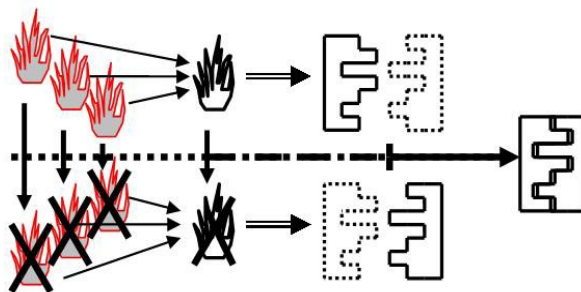
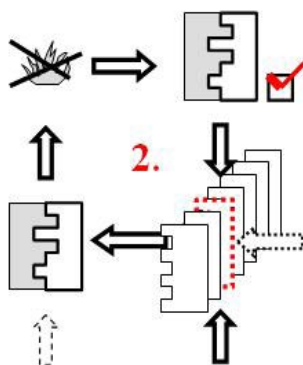


Figure 4. Aggregated scheme on fire and the evolution of the lessons learnt from extinguishing it. Source: author

The amalgamation of previous schemes into a given incident is shown in figure 5. The long-term memory of a firefighting manager, through practical experience, has the schemes of both different fires and their extinguishing characteristics. During another

alert, information available and collected on a fire automatically generates the recollection of the scheme necessary to solve it, based on which a firefighting manager defines the firefighting tactics necessary. However, the results of association studies clearly point in the direction that at a given fire (problem) managers do not focus on the fire as a problem but rather on its immediate solution [20]. From this, author makes the conclusion that a decision-maker will not follow the change of the characteristics of a fire, but the validity of solution scheme, that is, the dynamics of the implementation of the extinguishing process. This does not mean a contradiction with the previous, but rather a difference in views, the shift of emphasis of the focus of attention.

Recollection and matching of solutions (fighting tactics) according to the type of fire, and confirmation in case of successful extinction



A fire and its solution schemes exist together in the memory of firefighting managers.

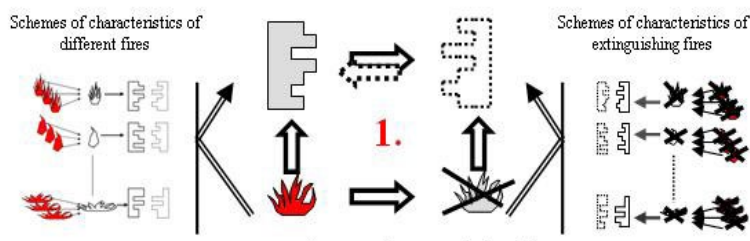


Figure 5. Decision-making mechanism of a firefighting manager. Source: author

The difference in views, that is, the shift of emphasis means that a firefighting manager does not focus on the change of characteristics of a fire, but rather on the expected evolvement and dynamics of the scheme selected, i.e. extinguishing tactics. Based on the previous, these are, of course, inseparable from each other; however, author finds the dominance of the interventions trend in the results of association studies in the case of firefighters so strong that, based on it, author judges his above conclusion to be justified.

The above do not contradict Klein's model, they rather complement it. Klein, in his model, evaluates (imagines what will happen) the results of matching schemes by the decision-maker prior to performing action version, which, based on author's own experience, is so without doubt, however the aftermath of the decision, in author's opinion, is much more significant in case of firefighting managers. Since the problem immediately and automatically generates both the direction of the solution and start of the action version, rather the process itself is important in terms of efficiency, which is caused by the decision. The schemes based on experience certainly contain the information on the dynamics of the process of fire, so if it meets the expectations, we do not have to modify the original firefighting tactics. However, if the dynamics of the process does not suit the expected, the change is inevitable in the performance of efficiency. Based on the above, the recognition-primed decision is not just an individual act before extinguishing the fire, but it is also the continuous accompaniment as needed. By doing this, author shares the view that the experienced decision-maker perceives the problem together with its solution, furthermore, author extends the continuous co-existence of the problem and of the whole process of solution of an emergency (firefighting and technical rescue).

5. CONCLUSION

In this paper author made efforts to examine and show the mechanisms promoting the more efficient decision-making of firefighting managers. Author demonstrated the linking opportunities of recognition-primed decision procedure and analogical thinking, pointing out the fact that the two do not exclude each other. If an intervention is protracted or longer time is available for the decision, many times, firefighting managers may achieve more efficient firefighting by using the latter.

If not enough time is available for analyzing and evaluating decision-making, recognition-primed procedures receive a greater role. (Critical thinking uses recognition procedures, during which the decision-making process can be accelerated or analyzed with the help of a quick test and depending on the time available. The quick test, considering the circumstances, hinders recognition-primed decision and prefers critical thinking. However, when the circumstances are inappropriate for critical analyzing thinking, the quick test allows immediate reply.

Despite the limited decision capacity, thanks to recognition-primed mechanisms, in most of the occasions, correct decision is made by firefighting managers. Time limit precludes the possibility for the firefighting manager to carry out analyses necessary for the classic model, therefore, the selection of the optimal possibility is objectively not attainable by the decision-maker. The decision-maker is not striving to achieve ideal results, as a response to the difficulties of collecting information and reducing costs in relation, but depending on the circumstances, he is satisfied with the its satisfactory solution.

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