

## EXAMINING DECISION MAKING IN EXTREME CONTEXTS: SPECIFICS AND PSYCHOLOGICAL IMPLICATIONS

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Received: 30<sup>th</sup> August 2024

Accepted: 18<sup>th</sup> September 2024

Review paper

**Abstract:** *Decision making (DM) is a complex psychological process and one of the crucial aspects in case of high-reliability operational positions' performance, especially in their leadership. This concept highly differs from the "ordinary" DM, depending on other contextual factors as hierarchical level of DM, work context nature or operation' phase, type of DM task, level of uncertainty or time criticality and str. Even contributed by a number of disciplines through the years, the new DM theories are eclectic, demanding a multidisciplinary approach to be understood. The psychological relations are the core of the oldest and newest leadership behavior models.*

*Explaining the DM process, terms and theories, and its specifics in extreme contexts, especially the significant correlations with psychological variables (predictors, inter-variables or outcomes) will increase operational personnel' training or in-situ performance quality, also giving the answers for valid psychological screening procedures and simulations construction process.*

**Key words:** *Dynamic decision making, High-reliability operational personnel, Psychological factors, Intuition, Use-inspired sciences*

### 1. INTRODUCTION

*Decision making* is a complex construct. As a term can be recognized as a *decision*, meaning which decision is best (rational process that explains how to choose between alternatives, analyzing the way of thinking in one situation), and a *behavior* or a psychological process of how the decision is made (explaining the psychological and other factors that influence the way of reaching the decision, analyzing subjective reaction on some situation or problem). The first approach include analyzing past and possible events as consequences of the decision before it is made, while the second explains the psychological consequences of that process – what that process mean or what is happening on the mental (cognitive-behavioral or psychological) level. In *extreme contexts* (EC) case (uncertain and complex environments)

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(military as high-reliability organization, crises, firefighting, private and national security guards and organizations, kinds of national security training centers and str.), especially the contexts of operational acting of high-reliability operational (HRO) personnel (SF, military pilots, SWAT teams, undercover agents, firefighters..) (Dimitrovska, A., 2018; Dimitrovska, 2015), there are specifics in DM processes (DMP), that give new definitions and approaches of this phenomena (some of which aspects have been named as a *DM under stress*, .. by the classical approaches). So, the literature mentions *DM under risk*, *DM in crises*, *dynamic DM*.. as differentiate terms. In these approaches intuition (*combat dynamic intuition*) was found as an essential construct, defined as a cognitive capacity possessed by commander when conducting operations, or its ability to think strategically in dynamic situations based on a non-linear knowledge (Bakken & Gilljam, 2003).

As a phenomena it was a subject in many scientific disciplines, that were contributed in the last over than three centuries with different DM theories, concepts and models, explaining it from their aspect, as mathematic, economy and cybernetic vs. biological, cognitive, and other social or operational sciences. The two groups of approaches have been found as dominant: 1. *rational* or *economic* (named as *normative DM models*) as the first, and 2. *psychological* (mostly cognitive psychology), as the younger science, named as *descriptive DM theories* (Cadet, 2018); both explained above. In the last years it was found a need of integrating the approaches, recognizing the emerging theories as eclectic, which needs a multidisciplinary approach in order this phenomena to be understood (Oliveira, 2007). In the nowadays, DM is a central research topic in *decision sciences*, while its application in life as a performance in HRO environments, is a part of *use-inspired sciences* (human performance' applied (military) researches, that are focused on particular contexts specific needs, apart from so much of psychological science, crossing the disciplinary boundaries and gaining with applied psychology' (as oldest in these sciences) interdisciplinary nature (Moskowitz, 1977), in order to eliminate the misguided gap of separating knowledge and usage of scientific disciplines. Compared with academic applied psychologists, these researches are oriented to real-world problems, especially in HRO environments (O'Connor & Cohn, 2010). Otherwise, the interdisciplinary integration has been largely ignored in *theories of DM under risk* in behavioral sciences (Mishra, 2014). *Naturalistic DM model* was specially developed for understanding human DM in complex real-world or HRO vs. laboratory settings, for which classical DM models/strategies abilities are limited to encompass (take too long) (Klein, 1980). As model of psychologist specialized for operational settings researches, it had affected the Army doctrine, implementing intuitive DM in Army FM, training program, basis for tactical DM in Swedish armed forces, guidance for related cognitive skills (as TADMUS - Tactical DM Under Stress, including US Navy shoot-down decisions, individual and team decision training during SIT - stress inoculation training in military SF), experiential practice. The classical DM theories' limitation for DM in non-structured settings was also confirmed from some cognitive theories, done parallel (Klein, 2008). This work will introduce some important topics for DM as a human behavior, in order to better understanding and enhancing performance in these environments.

The individual differences or variations in human behavior didn't found any theoretical basis in the normative model; neither cognitive psychology gave a general or compatible theory that explains the reason of human deviation from rational behavior, nor supported existence of dominant decision rule, besides the filters of simplification in individuals (which impact on DM always has individual and contextual variance), as some factors. But the both approaches allude on uncertain scenarios or contextual factors (believes or culture (Sapir, 1977), as an unconscious system of meanings), that influence or corrupt the information processing and interpretation of environment, which haven't been explained by any of DM theories before.

Culture is also related with ethic (ethical analyses or dilemmas) which is an important phase in DMP (individual or group), presented in *cultural ethical model of DM*, and where affection of culture still remains unclear, as well (Oliveira, 2007). On the other hand, rational theories are dealing with the rational behavior, but put accent on the process of choosing, while the behavior as the center of the psychological approach has a broader sense, including all psychological processes (or predictors) of DM before taking an action, as externally visible behavior (causal relations in the real-life situations). In the military DMP three important factor groups were revealed: *psychological*, *social* and *situational*. So, in performance measurement, what is evaluated is the quality of the decision, that is hard or has no final or precise methodology (in which takes part question about ethical dilemmas, also), while in training (or selection) is worked on psychological (which are changeable) and environmental factors found as significant predictors of the DMP as a performance' aspect in humans for that context, in order of its enhancement (Dimitrovska, 2018; Dimitrovska, 2015).

As a cognitive process DM consists of *phases*: outlining the goal, gathering information, developing alternatives, weighting positive and negative consequences of each, identifying the best (MD), developing plan of action and immediately taking action to implement it and examining the feedback. So, psychologically *DM* can be in shortly defined as a process of identifying and choosing alternatives and course of action (COA), based on a resulting cognitive selection process of subjective beliefs, values and preferences. According to the *dual process theory*, DM is a result of the interplay between two cognitive processes: an *automatic intuitive system* (named as "System 1" - bottom-up, fast and implicit) and an *effortful rational system* ("System 2" - top-down, slow, and explicit) (Kahneman, 2011). As a term differ from *problem analysis*, that as a process must be done first and information gathered may be used in DM; or *problem solving* (term sometimes used for *intelligence* or *general cognitive abilities* (CA), which with temperament are the only that are completely congenital in human) activity, and has a different meaning in psychology, computer or military sciences. In psychology it is a mental process of finding solution to problem encountered in life (starting with a problem-finding and a problem-shaping, than it is simplified, generating possible solutions and evaluating them), which is usually situation or context specific, where the key is in understanding' ability what the goal is and which rule could be applied. Similar term is *judgment*, which is a part of DM, defined as an evaluation of evidences to MD - a quality of cognitive facilities and adjudicational capabilities, typically named as *wisdom* or *discernment* (can be psychological or moral in nature). Related cognitive processes are *planning*, *learning*, *memory and knowledge*. DM is based on *explicit knowledge* ("know that" or facts) and *tacit knowledge* (Polanyi, 1958) (difficult to transmit to another person by writing it down, adequately verbalizing its meaning or be understood by recipient, neither can be used without the "knowing-subject", his cooperation and trust among them; is named as a "know-how", usually is not aware neither the way it can be valuable for others; it is intuitive, personal and contextual, and can be revealed only through practical experience in relevant context), that in practice are related, what is vital for creating a new knowledge. Otherwise, *intuition* is defined as smooth automatic performance of learned behavior sequences that often can produce wise DM, allowing the knowledge almost instantly about what the best COA is (Khatry & Ng, 2000); or in shortly, an ability to acquire knowledge without recourse to conscious reasoning. Other term, usual for battlefield DM, is *critical thinking*, that unites the six senses' obtained information in analyses to form a judgment, or "thinking about thinking".

## 2. SPECIFICS OF DECISION MAKING IN EXTREME CONTEXTS

DM in EC is defined as a psychological process of choosing between various alternatives with intent of reaching max number of goals, while avoiding damages and unnecessary risks and by using min amount of resources (Heichal, 1992). At that, *military DM* is perceived as both

art and science, defined as a complex process achieved by teams with incomplete, uncertain information, often under time constrain; in which decisions are made based on commander's specific military (operational or tactical) experience and training, and where the *subjective perception* (psychological factors that are changing with that) of situational severity is the main influence on their quality. Some suggestions about dealing with these factors are: improving operational knowledge base, assistance by experience based policies, cognitive to automatic DMP changing, distance advices support by experienced professional counselor, simulation training, stressful task experience, and other mental preparation that must be adjusted to specific person and situation (Cohen, 2008). So, DMP in EC differs (cognitively and descriptively) from DM in controlled contexts (Dimitrovska, 2024) in some specifics as: *time limitation* - a need for high tempo in order to take and keep initiative in battle; *information poverty* - inaccurate, incomplete, confusing information of the present, ambiguity or overload; *uncertainty* - a result of information lack with regard to the decision' scope and the probability of occurrence of various results reached by making a specific decision; *dynamic and continually changing conditions* - dynamic decision problem on field - requires series of decisions that are not independent, the problem state changes by its own and the DM-er action, decisions must be made in real time; *risk and real life-threatening conditions*; *complex situation* - battlefield activities are affected by a lot of factors, not at least humans and at different level or number of units and activities (*multiple players, organizational and environmental constrains*); *shifting and competing goals* vs. ill-defined goals and ill-structured tasks; *high stakes and extreme failure consequences*, which potential is difficult to be fully evaluate; and str.

Regarding the *measuring quality*, a good decision is usually one that brings *good results*, but *DMP quality* can also be parameter (a poor result with no fault of the DM-er can be determinate as a good if it was made via regular steps). In DM in EC min the number of errors is most important. As a consequence of dynamic it can only be judged in retrospection, while what is right or wrong is a result of when is done and what the opponent did. The DMP differs in *different DM level* (command hierarchy) in its nature (also differences in cognitive processes - mental orientation toward now vs. future) and the way in which it's organized. *At the lowest level* DMP is individual, described as a *reaction task*, with *split-second decisions*, where the main problem is correct situational perceiving, and appropriate response in a short time (a kind of reflex) is acquirable only through training and practice. *At the higher level* there are no rules about the way of reaction in situations, but only a general framework about steps (not action-oriented) in DMP (group), that consists in *making plans* for future actions. Time pressure decreases decision quality, while using most simple strategies (emphasizing negative information and prioritization of most important dimensions in alternatives). The inverted U-shape of stress-performance relationship was found relevant for group thinking also, while the optimal arousal level increases with *task' difficulty or complexity* (routine vs. non-routine **type of task**). As a cognitive task performance DM differs in *different task levels*, also. Two cognitive processes are important at the *lower level*: recognition of the tactical situation (patterns) and using the learned procedures (predefined reactions), while a good task performance is mainly a question of timelines, speed and accuracy of cognitive environment' representation. At the *higher level* accent is on DMP quality, not much on speed ('*groupthink*') (Raaijmakers, 1990). The DMP differs in *static tasks* (*adaptive* strategy selection - strikes the efficient balance between effort and accuracy) vs. *dynamic tasks* (contextual changes over time) - characterized with complexity and time pressure, and require DM in real time (what and when should be done) and continuously. **Time pressure** is a result of waiting too long for intervention (understanding the relation of system dynamic and DM-er own time use, is needed). For the *multiple decisions* requirement an appropriate mental representation quality is crucial, in order to future outcomes appropriate anticipation (accurate timing behavior

requires extensive knowledge about the causal and temporal relations between system components). Sufficient *feedback* is one of the basic aspects, so appropriate *diagnoses strategy* selection was shown as poorer in dynamic than in static task, confirmed in the existing tendency of choosing *judgment-oriented strategy* (requesting information in uncertainty – “first think, than act”) as a priority in situations where *action-oriented strategy* (“just apply action”) is more efficient, what decreases performance, given the case of missing opportunity to learn the strategy - outcome relation, that is a necessary condition for adaptive behavior. DM in dynamic tasks was found performed poorly, given the lack of CA in humans for solving high-order nonlinear differential equation systems intuitively; although the accurate system control in real-life situations is possible in experts (only after learning the input-output signals relation or knowledge acquiring), explaining why experienced DM in naturalistic tradition is that sample by using the real-time information more accurately (Kersholt & Raaijmakers, 1997). As in leadership, different way of DMP correlates with effectiveness in ***different phase of “in-extremis” operation*** (autocratic/directive leadership with fast decisions in *in situ phase* is necessity vs. more administrative control on strategic level or routine day context, while creating “*cognitive shifts*” by “*possibilistic thinking*” in “threat preparation” phase or “*psychic reorganization*” after the extreme event, is crucial (Dimitrovska, 2018). Likewise, ***uncertainty***, defined as a sense of doubt that blocks or delays action (in context of action), is a subjective condition, and coping with it lies in the heart of DM (contrast between choosing alternative that is the best consequence and implementing action that is appropriate for/match with the DM-er role or situation). *Types of uncertainty* are classified according to their *issue* (what is uncertain: outcomes, situation or alternatives) and *source* (what causes it: incomplete information, inadequate understanding – conflicting meanings or undifferentiated - equally attractive/unattractive alternatives). While the basic categories of coping strategies are: *reducing* (collecting additional information before MD or deferring decision until it becomes available), *acknowledging* (taking into account in selection the COA or preparing to avoid or confront potential risks) and *suppressing it* (denial or rationalization). In Israeli military male students as dominant was found inadequate understanding of situation given the equivocal information and conflict among alternatives given the equally attractive outcomes (subjective above objective sources - naturalistic DM is characteristically driven by situation assessment), dominant matching above the consequential choice (that consists with naturalistic DM) and suppression coping as soundly minimal vs. using different coping strategies for different types of uncertainty (Lipshitz & Strauss, 1997).

Also was found a great discrepancy between traditional perspective models for military DM and DM way of experienced officers in field. Actually, military commanders and similar staff lack of useful real situation DM model, while they use own different strategies for their DM. As most common used were the *naturalistic strategies* or *Recognition-Primed Decision Model* (Klein, 1989), which can make effective decision without analyses in experienced operational commanders (as intuitive strategies), swaying between intuition and analysis vs. analytical thinking in traditional military DM. Operational five phased (Identify Mission and Conceptualize COA-concept of action, Analyze/Operationalize COA- plan from the concept, War-game COA - possible enemy COAs, and Develop Operational Orders) *Recognition Planning Model (RPM)* of field military DM (Schmitt & Klein, 1999) differ from *Planning Under Time-pressure Model (PUT)*, primarily intended for higher tactical army units in field on the lower level, as an alternative perspective in military DM, for generating the faster tempo. Rooted in naturalistic DM tradition, PUT model accent planning, modifying and refining the COA not choosing between alternatives, with phases of: *understand the mission* - clarifying what must be achieved according to order or situation, or preliminary goal state vision overlay in terms of capabilities not in units; *situation assessment* - integrating information in holistic picture arisen (strong emphases is put on a thorough understanding of

situation and threat detection as a base - this phase is crucial difference); *generate (all) possible concept COA* - visualized, *define success criteria*; *develop "credible" tentative combat plan* - that feels right to commander; *simulation* - confronting solution with possible scenarios for enemy alternatives and understanding required modifications; *decide how task should be carried out*; *develop mission order "step one of the plan"* - transforming decision in orders to direct subordinate; and *develop opportunities for proactive DM* - future follow-up of action continue in staff. As a dynamic model it could be changed according to situation needs and planners' individual preferences (Thunholm, 2004). *Situational awareness* (SA) (perceiving elements in environment, understanding them and projection of their status into near future) is not only a *situational assessment* (explained in limited space in working memory, errors in retrieval from long-term memory and cognitive effort required by executive process) in commanders, important for battlefield DM. SA explains the way of commander' information integration from all sources (observation, sensors, orders, and reports) with his knowledge, experience and tactic to develop an individual situation understanding. SA model consists of battlefield state and operation structure, that needs more intuitive ways of DM, and which commander' cognitive model has requirements as: *control*, *memory structures* (static and dynamic knowledge), *information gathering*, *situation assessment* (identification of possible threats by belief network and uncertain information gathered), planning and plan recognition, and learning. Emphasized is the importance of all information coming to commander in appropriate time, as process happening through intelligence and other agents. So the decision is made after the battlefield monitoring, situation assessment and generation of COA (Juarez-Espinosa & Gonzalez, 2004).

Traditional (rational) approach ("emotions need to be kept out from DPM for gaining a good decision") was upgraded with emphasizing subliminal/unspoken processes (intuition and tacit knowledge or intuitive DM - also essential elements in hard to quantify or interpret DM situation) approach in which emotions are key component, specialized for crisis or other EC. Physiologically based, *emotions* as a surviving component, are subject in psycho-biological sciences, which adaptive function in high uncertainty serves as a dual coping mechanism: allows activation of effective dealing with present situation (through experience anticipated fear, which is tend to min), while not being immobilized by past negative consequences fear memories. The *emotional response* is a somatic marker, forcing attention on alternative with negative outcome for its immediate rejection, increasing DMP accuracy and efficiency. As appropriate (increased awareness, physical arousal and thinking acuity, or inappropriate - traditional "fight, flight or paralyzes") it interfere the past *experience* (education and training) - *emotional memory* connection, facilitates recognition (tacit knowledge impact on intuitive DMP) and rapid response of "good feeling" about "right decision", or *intuition*; that improve ethical DM. As unconscious it helps in giving structure/ meaning to experience and situation obtained by perception and interpretation, providing an automated detection system to focus only on most important component (information) of situation scenario (Sayegh, et al., 2004). Naturalistic approach put great emphases on appropriate *experience* role in intuitive DM in experts; pointing out that it doesn't automatically translate into expertise, about which two is need to be careful in distinguishing. Assessments are not only about cues, but also in capabilities and their intersection (Klein, 2015). Other approach explains DM as a way of coping with (negative) *decision-generated emotions*, given emotional trade-off difficulty in prioritizing some goals (alternatives) over another that must be resolved (emotions are signal for motivation to work harder and resolve choice problem or to avoid distressing decision operations). Decisions are made by trading off the cognitive effort required by potential strategy against the potential accuracy provided by it (Luce, 2005). Despite the impossibility to use only one *DM style* (DMS), one (*rational, intuitive, avoidant, dependent, spontaneous*) is always dominant. Spontaneous was shown as can be seen as a kind of high speed intuitive

style in EC' DM (only these both were unrelated to self-regulation and self-esteem), while *habit* (action control and self-esteem) and situational factors, not general CA (*educative ability*) showed a substantial role as predictors in individual DM behavior. Finally, was shown a need for wider DMS' definition (not only as a habit based tendency to respond in certain way on specific DM situation) but as a response pattern exposed by an individual (determined by DM situation, DM task and individual DM-er). Except in habits, individual differences were shown significant in some basic CA also (information processing way, self-evaluation and self-regulation), having a consistent impact on response patterns. In Swedish military offices, rational combined with intuitive DMS was found dominant, that otherwise is a result of cultural DM specifics (appropriate DMS is not easy to be learned as is need for specific requirements, but needs to be flexible (vs. stable CA), on individual DM-er abilities for these situations). DMS - behavior link shown in realistic DM-tasks need to be researched (Thunholm, 2004). *Self-efficacy* (personal beliefs in own ability to perform *basic military tasks* or *leading procedures*) is positively related with successful DM in military, especially the second type; self-efficacy and DM is positively related with low perceived risk (Ambrulaitienė, 2018).

### **3. THE IMPORTANCE OF ETHICAL ASPECTS OF DECISION MAKING IN EXTREME CONTEXTS**

Dealing with ethical dilemmas is necessary for any environment, mostly for the complex or operational one. *Moral values*, as private and influenced by culture, religion and family, are differentiated than *ethical values*, as public or universally accepted believes about the right and wrong. *Military ethic* separates "soldiers from murderers" (while its role in modern missions often shifts between peacekeeper, diplomat and warrior), protects them from moral stress and injuries, and promotes unit cohesion, while *ethical failure* have reach political and strategic consequences. It explains why the *moral judgment* is crucial in military and other "in extremis" profession, so understanding the way they make ethical decisions and factors that affect and interact this process, is highly important. An *interactional dual-process model* describes moral DM in professional real-life situations in five aspects, putting recognition of ethical issues in situation (*moral awareness*) as a priority, that allows *moral judgment* (assessment of values and interests) making, influenced by aspects of *moral sensitivity* (moral stimuli detection) and *moral intensity* (important moral issues in situation) assessment (degree of harm and perceived social agreements that act is ethical or not), as factors for *ethical action* (deliberate behaviors related to fair, just and/or beneficent outcomes to others). Accent is put on *reasoning-intuition internal dual process* that interfere perception and judgment, while the decision is reached only when the *dual-processes*, *post hoc reasoning* and *social interaction* are terminated. Different mental-processing sense-making strategies in high vs. low-intensity scenarios was found in soldiers; deployment experience reduces harm degree perception; despite existing differences in ethical judgments in military vs. civilian samples, highlighting the complexity and challenges in *operational ethic*, for which appropriate military training is important (Seiler, et al., 2010; Thompson, et al., 2017).

### **4. THE PSYCHOLOGICAL PREDICTORS OF DM IN EXTREME CONTEXTS**

Military (or other specialized operational) education and training (with appropriate program) in military and other HRO personnel was found crucial for their performance (which aspect is DM) enhancement, for which inter-correlations with psychological variables is important (mainly dynamic aspects), given the leaders' lens role in field or "leader of leaders" concept. *General CA* was found as best predictor for work and training performance; their predictive ability increases with work complexity that is higher in military vs. civilian professions, and

training vs. work performance; decreases in field vs. academic performance and in law enforcement vs. other civilian professions. *Knowledge* as their main positive mediator for all types of performance (which indirect impact was found higher than direct, and through which CA and experience have impact on performance) confirm the importance of the training. The relation with *experience* is complex, which decreases with age and length of experience; while the specific performance types (or experience) upgrade the knowledge. “5 factor” *personality traits*’ predictive ability differs in dimensions, intensity, professions and contexts, while the relation with C was found as most consistent; sub-dimensions was found as better approach in different tasks prediction, while team performance approach is important in SWAT and SF; specific traits’ combinations was found relevant for hazard professions or leaders. *Coping* (in which base is *cognitive appraisal*) is mediator in stressor-performance relation, mediator-moderator in static predictors-performance relation, nor their relation with performance isn’t direct. In field professions *problem-oriented strategies* were found as positive predictor (crucial in their training as proximal dimensions). *Stress* (as contextual predictor) is mediator-moderator in personal predictors-performance relation, which depends on stress intensity (inverted U-shape of stress-performance relationship is important). Organizational and operational types and relations are specific for NS context, mostly in EC. *Leadership style*’ (as a contextual predictor) efficacy depends on the context, leaders and followers personality, group specifics, task, higher subordinate style, hierarchy level., differs in NSS, especially in HRO personnel. Although *task-oriented* is dominant in structured contexts, the people-oriented style shouldn’t be omitted (Dimitrovska, 2018; Dimitrovska, 2024; Dimitrovska, 2015; Gjozo, et al., 2015; O’Connor & Cohn, 2010).

## 5. CONCLUSION

Decision making in extreme contexts stresses intuition as a central capability in commanders of high reliability occupations. DM is a central research topic in decision sciences, which are a part of the use-inspired sciences. The naturalistic DM model, developed by psychologist, implemented the intuitive DM in Army FM. Similar terms of DM are problem analyzing, problem solving, judgment, intuition and critical thinking. Tacit knowledge or know-how, usually is not aware, and can be revealed only through practical experience in relevant context. DMP in EC differs (cognitively and descriptively) from DM in controlled contexts. In measuring DM in EC min the number of errors is most important. The DMP differs in different DM level, different type of tasks, different task level and different phase of “in-extremis” operation. The concept of time pressure and uncertainty was examined. Recognition Planning Model of field military DM differ from Planning under Time-pressure Model. The Situational awareness model consists of battlefield state and operation structure that needs more intuitive ways of DM. Emotions is a key component in examining DM in EC. The moral judgment is crucial in military and other “in extremis” professions and it needs appropriate military training. The inter-correlations with psychological variables is important for military (and other HRO occupations) training, given the “lens role” of the leader in the field.

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