The Strategic Corporal, the Tactical General, and the Digital Coup d'oeil – Military Decision-Making and Organizational Competences in Future Military Operations

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ABSTRACT

The article describes how digitalization and the wide diffusion of knowledge technologies such as the Internet of (battlefield) things, big data, and artificial intelligence, are transforming military organization and practice, deeply affecting military practitioners and command at all levels. It considers how this transformation may affect Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) through a profound alteration in the ways in which data, information, and knowledge are generated, analysed, and applied. The relation between these technologies, Multi-Domain Operations, and mission command is also explored. It is argued that this transformation presents both possibilities and challenges; these are discussed using the concepts of the *strategic corporal* and the *tactical general*. Further, the article proposes two new concepts, *digital mission command* and *digital coup d'oeil*, derived from two traditionally well-known military concepts. The article discusses the practical implications of these two new concepts and suggests ways for the military organization to move ahead when navigating future technological landscapes in which data plays a significant role.

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INTRODUCTION

This article describes how digitalization and the rise of knowledge technologies such as the so-called Internet of things (IoT), big data, and artificial intelligence (AI), are leading to a pervasive *datafication* of the operational environment. This datafication, explained in greater detail below, is increasingly affecting – and will eventually arguably transform – the military organization, military practice, and the ways in which military practitioners think about and do things. The article further considers how recent digital and technological developments are both disrupting the division of the three levels of war – the tactical, operational, and strategic – and changing the nature of operational art (see Ford & Hoskins, 2022; Raska, 2020). It is suggested that we can observe and reflect on this development through the analytical lens of the twin concepts of the *strategic corporal* (Krulak, 1999) and the *tactical general* (Singer, 2009). This leads us to argue that, in light of this disruptive digital and technological development, military practitioners and researchers have to rethink two relatively well-known concepts that have played a central role in Western military thinking over the last 150 years: mission command (see, for example, Shamir, 2011; Storr, 2003; Moltke, 1888/1995) and coup d'oeil (Clausewitz, 1832/2021).

The pervasive, disruptive character and potential of digital transformation and new intelligent technologies are recognized by most military organizations (see, for example, Ford & Hoskins, 2022; NATO, 2023a; NATO, 2023b; NATO, 2022; NATO, 2017; Reding & Eton, 2020; U.S. Army, 2021a; TRADOC, 2018; Ferris, 2004). In a Western context, a number of doctrines, strategies, concepts, and white papers consider both the emergence and implementation of these technologies (IoT, big data, and AI) and the increasing digitalization of the operational environment (NATO, 2023a; NATO, 2023b; NATO, 2022; NATO, 2017; Vergun, 2022; UK Ministry of Defence, 2021; U.S. Army, 2021b; Reding & Eaton, 2020). Among other things, it is noted how digital and intelligent technologies are already radically affecting, and will eventually transform, not only how military organizations organize, plan, and conduct military operations, but also how military organizations understand the operational environment and military practice from the outset (Vergun, 2022; U.S. Army, 2021a; Heltberg, 2021; NATO, 2019; Nørgaard & Sjøgren, 2019; TRADOC, 2017a; Brunet & Claudon, 2015; Coker, 2015). Widely experienced among commanders and soldiers throughout the military organization, this transformation is a practical reality that must now be be dealt with, both in force development/capacity building and in operational force deployment.

The impact on military practice of digital transformation and new technologies is felt, not least, by the military operative commander – be it the platoon commander with rifle in hand or the general in central command; technologies such as IoT, big data, and AI, while already influencing the military decision-making process, are expected to create further breakthroughs in the future, notably in relation to decision support and so-called C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance) capabilities (Reding & Eaton, 2020). In light of this, and specifically in light of the fundamental changes in the ways in which data, information, and knowledge are generated, processed, and analysed (NATO, 2023b; NATO 2022; Fawcett, 2022; TRADOC, 2017b; Ferris, 2004; Ackoff, 1989), this article highlights some of the implications of this transformation for the military organization and the military decision-maker. Expanding both the physical and information space in which decisions are made, this development transforms both the foundation for and the manner in which military actors make decisions. This article points to the advent of a (military) epistemological transformation – that is, a change in the conditions for military knowledge, including a change in the conditions for what military decision-makers can know and how they can know it.

Further, it is argued below that this knowledge-technology-induced transformation offers opportunities and challenges for the military organization and military decision-maker alike. It is also argued that it is crucial to look more generally at how digitalization changes core concepts within military theory and practice, including the concepts of mission command and coup d'oeil. With this in mind, the article contributes to the investigation of the implications for military command of the digitalization and technological transformation of military organization and the operational environment.

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The aim of the article is twofold: first, to provide an overview of general digital and technological developments within the framework of IoT, big data, and AI, and to consider how they are influencing and entangled with military organization and command; second, the article wishes to initiate a professional discussion on how digital and technological disruptions impact existing military concepts. We argue that there is a need for reflection on how our military conceptual vocabulary may be updated to make it fit for present and future digital operational realities. This leads us to propose two new concepts: *digital mission command* and *digital coup d'oeil*.

The article is structured as follows. First, three of the (currently) most central knowledge technologies – the Internet of (battlefield) things, big data, and AI – are explained. Here, the article also describes how datafication can be seen as different from – and as more than – digitalization. Focusing on the concept of multi-domain operations, the article then considers how these knowledge technologies are currently changing, and could in future transform, Western military organizations. This includes impacts on the principle of mission command. After this, the article focuses on the implications for the individual military decision-maker, using the concepts of the strategic corporal and tactical general as an analytical lens. Based on this, the article discusses the concepts of digital mission command and digital coup d'oeil as proposed conceptual tools for addressing and considering how Western military organizations can respond to these changes. This section and the concluding remarks also point to essential elements and conditions that military organizations and decision-makers may usefully consider and relate to in order to best prepare themselves to navigate these future knowledge databased technology landscapes.

IO(B)T, DATAFICATION, BIG DATA, AND ARTIFICIAL INTELLIGENCE

IO(B)T AND DATAFICATION

The Internet of things (IoT) describes the preliminary culmination and combination of two different developments. The first is the diffusion of the Internet into all aspects of quotidian life through virtually constant Internet access afforded by smartphones and other devices (Kobie, 2022). This is not exclusive to individuals; private and public organizations alike increasingly rely on the Internet. Our constant presence on the web implies that we are continually leaving traces of data that are being collected. The second development concerns sensor technology, where "smart" sensors of all kinds are becoming ever easier and cheaper to produce. Everything from cars and fridges to wristwatches are increasingly equipped with sensors that monitor and collect data, which can further be connected to the Internet (Kobie, 2022; NATO, 2017). Rapid developments in technology and quantum science are expected to further enhance this evolution (Reding & Eaton, 2020).

These two developments have led to what can be called the digitalization and networkification of people and things (Bousquet, 2009; Watling, 2022; Flyverbom et al., 2019; Nørgaard & Sjøgren, 2019) – terms indicating that a mass of knowledge and relationships and processes that were once analogue, and in many cases were not noted or recorded at all, have now been digitalized and connected in digital, networked solutions. Making qualitative knowledge and qualitative processes digital has also produced what is sometimes called "datafication" (Alexandrov et al., 2018; Marchegiani 2021; Tabrizi et al., 2019; Vial, 2019). This is a term used to describe the collection and generation of data about phenomena, relationships, objects, and interactions that have not previously been quantified or turned into data (Marchegiani 2021; Tabrizi et al., 2019; Vial, 2019). This term is also used to describe how data is increasingly performing in entirely new ways, as a structuring resource and catalyst in the organization of people, networks, and processes (Flyverbom et al., 2019; Alexandrov et al., 2018); we see this, for example, in the organising of military organizations and military operations. In this vein, the central aim of the NATO Data Exploitation Framework Policy (NATO, 2022) is to ensure that NATO is able to "leverage data *as a strategic resource*" in order to "achieve information superiority and *data-driven decision making* at all levels across the Alliance" (our emphasis). Further, the Implementation Strategy for NATO's Digital Transformation, endorsed by the NATO C3 Board in May 2023, has the stated vision that, by 2030, "NATO's Digital Transformation will enable the Alliance to conduct multi-domain operations, ensure interoperability across all domains, enhance situational awareness, and facilitate political consultation and data-driven decision-making" (NATO, 2023b). When we talk about datafication in and by defence forces, we are thus

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not talking about a purely technological phenomenon but, rather, something much broader in scope, both quantitatively and qualitatively. As noted by Cukier & Schoenberger (2013, p. 28), "the idea is that we can learn from a large body of information things *that we could not comprehend* when we used only smaller amounts" (our emphasis again). Datafication in and of defence forces thus relates to how we create and use knowledge; how we understand and organise human and material activities; and how we build and structure ways of managing the military organization and its activities.

In the military context, there is increasing talk of an Internet of battlefield things (IoBT), describing these developments in military organizations and the operational environments in which these organizations operate (Zhu et al., 2021; Russel & Abdelzaher, 2018). The developments in sensor technology noted above mean that everything from fragmentation vests to combat aircraft are increasingly being equipped with intelligent sensors and so-called edge computers expected to improve response times and save bandwidth (Kobie, 2022). Combined with the general development within digital knowledge technologies and C4ISR capabilities, this in turn means that military organizations, both in crisis and peacetime, are constantly collecting vast amounts of data on everything from administration and logistics to operations and training (Zhu et al., 2021). This collection takes place at all levels of war (tactical, operational, and strategic) and in all domains, both conventional (land, sea, and air) and in the "new" domains of cyberspace and space, thus generating what is often termed "big data" (Brunet & Claudon, 2015).

BIG DATA

"Big data" describes a profound development regarding the possibilities of generating, storing, interconnecting, analysing, and using data, including the IoT. Big data is often described in terms of the so-called *three Vs* of volume, variety, and velocity (see, for example, Aspelund et al., 2021; Brunet & Claudon, 2015).

"Volume" refers to the explosion in both the volume of existing data and the amount of new data constantly being collected that can be processed and used in a meaningful way (Aspelund et al., 2021). In the military context, this includes, for instance, satellite data, drone data, radar data, and sensor data from a wide variety of sensors equipped on, for example, tanks and aircraft or soldiers' optical sights and fragmentation vests. There is also data collected on the Internet – on social media and from other sources of open source intelligence (OSINT), data collected in cyberattacks (emails and company data, for example), and huge amounts of organizational and technical data about one's own military organization, including everything from payroll and personnel ratios to logistical and materiel data (see Eshel, 2023).

"Variety" refers to the fact that data are not only collected in a quantitative sense; many more different *types* of data are also collected (Aspelund et al., 2021). The variation relates both to how data are collected and to the content of that data. Thus, we are today collecting data on a wide range of phenomena and conditions on which we were not previously able to collect data (Cukier & Schoenberger, 2013). Finally, variety also includes the fact that, new big data analysis capabilities allows this multitude of diverse data to be combined, processed, and used in much more meaningful ways – the linking of social media data, credit card transactions, geospatial data, and drone imagery pertaining to an anti-terrorist operation, for example.

"Velocity" refers to the ways in which these huge amounts of diverse data are being collected, stored, used, and shared at an unprecedented pace (Aspelund et al., 2021). Massive bodies of data that would previously have taken months to process and analyse can now be processed faster and with almost no latency, through stream processing or batch processing. While data streaming processes analyse the data as it flows through a processing system, batch processing is using data sets that have already been stored (Vogel et al., 2021). In military contexts, stream processing can be used, for instance, in the application of near-real-time object-recognition algorithms to massive quantities of streamed video data from surveillance drones or equally significant quantities of video and satellite data reviewed to create a so-called "normal picture." Another application is in so-called battle management systems (BMS), which offer digital maps where one's positions, or those of adversaries and third-parties, are continuously updated for anyone with access to the system as new intelligence is reported. BMS and other such systems make it possible for military headquarters to obtain immediate

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visual access to what soldiers on the battlefield are seeing and experiencing via helmet cams and the like (Systematic, 2023; Eskel, 2023).

While these three Vs are the most common, sometimes scholars and practitioners operate with others, too. One such is *veracity* – the ways in which big data volume, variation, and velocity are transforming how we can understand and verify large-scale knowledge extraction (Rubin & Lukoianova, 2013). Another is *value*, indicating that big data is only meaningful if it can improve, optimise, or streamline existing processes, or if it can generate entirely new types of knowledge and insights (Ishwarappa & Anuradha, 2015). In relation to big data and the possibilities that they bring about, important questions arise about how to qualify, select, analyse, contextualize, and, not least, *present* data – i.e. how to "curate" data and the information produced from it. This digital curation is central to understanding and critically engaging with the images that are created and communicated, not least in appreciating the possibilities for action and decision-making that these visualizations may implicitly either suggest or exclude (see, for example, Flyverbom & Murray, 2018; Eshel, 2023). This issue is sometimes related to the last V, which recurs frequently: *visualization.* This concerns the ways in which big data is a matter, also, of generating visualizations of digital intelligence that are useful to those who need to extract relevant information from it (Flyverbom, 2019).

ARTIFICIAL INTELLIGENCE

The last technology of relevance here is AI, which can be understood as an attempt at using different technologies and methods to mirror cognitive abilities previously only held by humans. Researchers often distinguish between two types of AI: general and narrow artificial intelligence (Ayoub & Payne, 2016). General AI is equivalent to, or exceeds, human cognition in all aspects. General AI currently remains a theoretical concept, fictionally the domain of sci-fi movies like *The Terminator*. Narrow AI, on the other hand, is the attempt to mimic a small part of a specific cognitive ability to solve a specific task such as image recognition, data sorting, or playing chess. If we take an AI chatbot like ChatGPT, as impressive as it may be, we would mostly still categorise it as narrow AI: its output is narrow. Although the algorithm behind ChatGPT has been developed to solve multiple problems (answering questions or writing poems, for example), and as such in one perspective can be considered as pertaining to general AI, the chatbot is limited in regards to its access to data. Thus, although the rationality behind general AI is that it can provide context-based answers based on multiple datasets, the narrowness of ChatGPT's output is an artefact of its dataset; it is, so to speak, based on a closed eco-system.

The whole point of AI is that its algorithms are self-learning: that is, they can self-correct and derive new algorithms from their improved "understanding" (Domingos, 2015, p. 45; Rathore et al., 2021; Jiang, 2018; Miahlie, 2018). Briefly, this works by having the narrow AI define some goals (outputs) and then "feeding" itself with huge amounts of data (inputs), which it then teaches itself to categorize and process according to the predefined outputs (knowing the difference between red and blue cars, for example). In current military contexts, the narrow AI has made its way into the operational environment and is predicted to affect and transform everything from administrative computing to logistics, surveillance, targeting, and command and control (Reding & Eaton, 2020; NATO, 2017). Narrow AI often outperforms human actors on accuracy, thoroughness, and speed in the specific tasks, such as image recognition and data sorting, it is designed to solve. In minutes or even seconds, AI-generated algorithms can analyse and process quantities of disparate data that would take a human analyst more than a lifetime to repeat.

A conceptual tool used by many Western militaries is the so-called OODA loop, first suggested by Boyd in 1996 (Boyd, 1996). The OODA loop describes four phases in the military decision process: Observe, Orient, Decide, Act (Boyd, 1996, p. 3). At present, AI is particularly used for supporting the phases of observation, orientation and action; it offers capabilities in terms of improving our understanding of the situation/battlefield (situational awareness) and in terms of decision support, i.e., the opportunity to use vast amounts of data to generate new and better information faster than one's adversary can (assuming one enjoys a condition of information superiority). This could ultimately lead to decision superiority – the making of comparatively better decisions at a comparatively greater speed (O'Shaughnessy, 2020). AI is also used to improve the precision of the execution of certain decisions, including the efficiency of weapons

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delivery (NATO, 2021; Reding & Eaton, 2020). While AI is expected to increasingly play a role in relation to things such as the development and suggestion of military courses of actions and in wargaming, a general reluctance remains in trusting it with the power to make decisions (Johnson, 2022; Nørgaard & Linden-Vørnle, 2021). Here, a primary objection relates to issues of justification: when the technology is self-learning and self-evolving, it may be difficult, even impossible, to "rewind" and track a given decision in order to establish the concrete reasoning or justification that determined why this and not another decision was made. Additionally, Nørgaard and Linden-Vørnle (2021; see also NATO, 2021) note that while AI might make the most efficient decisions, these decisions may not always comply with our legal and ethical perspectives.

In the following sections we will first use the concepts of multi-domain operations and mission command to consider some of the implications for the military organization of the development described above. After this, we look at some of the implications for the military decision-maker at the individual level. This is analysed through the concepts of the strategic corporal and the tactical general.

IMPLICATIONS FOR THE MILITARY ORGANIZATION: THE CONCEPTS OF MULTI-DOMAIN OPERATIONS AND MISSION COMMAND

The consensus view is that the increasing digitalization and datafication of the operational environment will lead to a transformation of future warfare (Bowers, 2022; Breitenbauch & Christensen, 2022; Lund-Hansen, 2022; Kollars, 2021; Reding & Eaton, 2020). Digital and technological developments have led to wide reflections on future warfare, resulting, among other things, in a number of doctrines, white papers, reports, concepts, and strategies describing how military organizations should fight and act in the digitalized operational environment of a future expected to be largely characterized by IoT, big data, and AI (Bollmann & Jacobsen 2023; Nørgaard & Linden-Vørnle, 2021; Reding & Eaton, 2020; TRADOC 2017a; USAFSG 2017). In the Western context, possibly the most significant conceptual development of these is encapsulated in the U.S. concept of multi-domain operations (MDO). The MDO concept was originally developed by the U.S. Army Training and Doctrine Command (TRADOC) and is at present being developed in various forms across the entire U.S. Armed Forces (TRADOC, 2018; Lund-Hansen 2022). NATO and individual member states, including Denmark, are also working on the concept (Bowers, 2022; Lund-Hansen, 2022; de-Leon, 2021). MDO describes how Western military organizations must fight in an operational environment marked by increasing complexity and ever-more capable potential adversaries. Bowers characterizes MDO as "a form of warfare that seeks to create effects by synchronizing and converging single, simultaneous or sequential actions across domains at sufficient speed and mass to gain operational advantage against a peer or near-peer competitor" (Bowers, 2022, p. 1).

A fundamental dimension of the development of MDO concerns how militaries should adapt to new technologies (big data, IoBT, AI) to mediate and manage the emerging challenges and to exploit arising opportunities (Lund-Hansen, 2022; UK Ministry of Defence, 2020). The basic idea of MDO is that by ensuring that the "right" data or information is available to the "right" actors at the "right" place and at the "right" time, it will be possible to focus particularly on accurately delivering the appropriate kinetic or non-kinetic effects rather than on the framework of *who* delivers it (U.S. Congressional Research Service, 2022; de Leon, 2021). This is expected to allow for the Allied dominance of the operational environment, not in all places or at all times, but at those times and places where achieving military targets and objectives is essential.

Having its conceptual focus on the importance of interconnectivity and integration of sections, services, and domains, the concept of MDO was criticized in the United States for failing to account for how to tackle the actual, practical challenges of joint operations, including, for example, how to synchronize and coordinate forces (de Leon, 2021). Due to these considerations, at the joint doctrinal level, multi-domain operations (MDO) has been translated into *joint all domain operations* (JADO), encompassing the practical intent to tie all services together under a new network architecture for command and control known

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as *JADC2* (Bowers, 2022; U.S. Congressional Research Service, 2022; de Leon, 2021). JADC2 comprises the practical implementation of all these knowledge technologies combined with different types of networking and communication technologies at the overall and joint levels. The implementation of JADO means the armed forces of the United States becoming digitally connected, so that data/information can be generated, processed, and shared anywhere in the organization at any time (UCRS, 2022). While JADC2 has yet to materialize, each of the various services have different initiatives underway to support this project (Demarest, 2022; Gill, 2022; UCSRS, 2022).[1] Similar initiatives also exist in NATO in the form of the Federated Mission Networking and Connected Forces initiatives (NATO, 2022). In Denmark, there is, as a "pre-requisite for implementation of Multi-Domain Operations," the vision of establishing a common digital infrastructure, or "defence information cloud," in the shape of the Danish Common Operational Information Environment (DACOIE). The aim of DACOIE is the effective use of data as a strategic resource enabling the provision of an adequate operational overview to support decision-making and communication (Rex 2023, p. 8).

Central to the whole idea of MDO/JADO is the implication of both a cognitive and a practical rupture with traditional military divisions of labour and demarcations of time, space, sectors, and tasks. In practice, this means, for example, that an army platoon commander will be able to call in fire support directly from a naval unit, or that the platoon will be able to request support from cyber capabilities, or something similar, bypassing the traditional, heavier military command structures. The whole MDO/JADO vision is tied to the effective implementation and use of technologies such as big data and AI. Ultimately these technologies would make it possible for all relevant actors to share the appropriate quantity and variety of different types of data at a sufficient pace to enable and sustain this focus on impact.

Technologies such as IoBT, big data, and AI all pertain to the domain of "knowledge technologies." It is precisely a change in relation to military knowledge – what we might term an "epistemological transformation" for the military practitioner – that these technologies will bring about. Epistemology is the philosophical discipline dealing with questions of the nature of knowledge, and related questions concerning its development and acquisition. Again, an idea central to MDO is that access to huge amounts of data and the possibility to rapidly process, share, and use this data will break down traditional military boundaries in terms of both the division of labour and of the perception and management of time and space. This is embedded, for example, in notions of military "services," "domains," "phases," and "levels." Through their (military) education and career in the military organization, military practitioners have been taught to think and make sense of their professional environment through notions such as these, relevant to their military practice. It is through such military divisions and their associated notions, conceptual apparatuses, doctrines, and procedures that military practitioners understand and view their professional world. The ideas of a division of domains, of distinct military services, the three levels of war, and the division into different phases of operations are thus absolutely fundamental elements in the military practitioner's professional perspective and ways of thinking. This has made good sense, precisely because such a common ordering of the conceptual and practical world has created a common language or terminology that, *inter alia*, describes and demarcates a clear division of labour between the different parts of the organization (the army takes care of the ground, for example, while the air force attends to the air). This military ordering has enabled large military organizations to coordinate, function, and interact, as the many involved actors have known what they have to do, when, and where, as well as what to expect from other involved actors. This has both practical and epistemological dimensions, as military terminology and its inherent demarcations have ensured that military decision-makers have known which types of data, information or knowledge have value or relevance for them and their operations (Paparone, 2013; Bousquet, 2009). Today, big data, IoBT, and AI mean that all military actors engaged in an operation are theoretically able to access all information simultaneously – which is also one of the foundational tenets of MDO/JADO. This is a vision of everyone having sufficient situational awareness of the activities throughout the organization and the operating environment at a pace permitting a focus on the delivery of effects, notwithstanding the conventional military divisions that have traditionally

1 Respectively, Project Convergence in the U.S. Army and Marine Corps, Project Advanced Battle Management System in the U.S. Air Force, and Project Overmatch in the U.S. Navy (Demarest 2022; Gill 2022).

determined who could do what. Whether this is practically possible, or will eventually become so, is another matter; it is a process offering both opportunities and challenges (Kollars, 2021).

A central question related to this concerns potential implications for the military concept of mission command. The concept, derived in the United States from the original German doctrinal concept of *auftragstaktik*, is today endorsed by NATO and its member states as the central command principle (NATO, 2019; Shamir, 2011). Mission command has been retained as a central leadership principle, also, in respect to future multi-domain operations (U.S. Army, 2022; see also Reynolds, 2022). While a full history of the concept cannot be covered in this article, fundamentally, mission command concerns the military commander setting out both a number of clearly defined intentions and objectives for a given military operation, and the amount of time, resources, and so on, available, and then allowing subordinates to decide for themselves how to accomplish their respective tasks (NATO, 2019, pp. 1–36). Besides leading to tactical military successes, this approach has been fundamental in the development of skilled officers and soldiers able to find solutions, through innovative and creative thinking, to the complex issues that military operations address and present (Johnson, 2022). Mission command is, in one perspective, chiefly a matter of knowing how to know something and being able to act upon it. In this sense, there is a certain understanding of epistemology already imbedded in how mission command is understood and practiced today. When the epistemological conditions are now changing, we need to consider what impacts these changes might have on the ways militaries understand and practice mission command.

The conceptual antithesis of mission command is known as *detailed*, or *top-down*, *command*. Here, precise and detailed orders are issued from the top of the command hierarchy and the exercise of initiative on the part of subordinate officers may be considered problematic (King, 2019). In practice, the two concepts of mission command and detailed command can be seen as the extremities of a continuum on which it is possible to blend elements of each approach, depending on an appraisal of the context, the situation, and the tasks to be solved. Auftragstaktik was originally introduced to accommodate the fact of battles and frontiers having expanded to a degree that a single commander could no longer physically assess the entire battle space and was, thus, frequently unable to direct tactical manoeuvres in a meaningful way. Communicating through dispatches conveyed by horse, commanders of different units were nevertheless expected to manoeuvre in concert; this brought about bottlenecks where decision-makers at all levels, waiting for orders, would not always exploit the most appropriate solutions. In this perspective, mission command can be seen as a kind of response to Clausewitz's notions of fog and friction (Shamir, 2011). It was, however, always presented as a balanced decision, as a means to an end, not an end in itself (Sjøgren, 2022; Shamir, 2011). With the new C4ISR capabilities and battle space management technologies, however, the capacity of military decision-makers at all levels to know and visualize the battle space has been restored, even when they cannot be physically present.

We will look further into implications of this in the following section, where we use the concepts of the strategic corporal and the tactical general to consider implications for the military decision-maker.

IMPLICATIONS FOR THE MILITARY DECISION-MAKER: THE STRATEGIC CORPORAL AND TACTICAL GENERAL

While the above opportunities and challenges pervade all levels of military decision-makers, whether the platoon leader or the general, they are expressed in at least two opposing ways. These can be described using the concepts of strategic corporal and tactical general, as developed by U.S. Marine Corps General Charles Krulak (1999) and military technology researcher Peter W. Singer (2009).

THE STRATEGIC CORPORAL

The strategic corporal is a concept originally suggested in article by Krulak (1999) in the context of his theory of the "three block war." The concept describes how the increasing complexity of the operational environment, combined with the introduction of the mass media on the battlefield, has resulted in a situation where even relatively low tactical-level decisions could have great strategic significance. An example could be how overly harsh conduct or specific

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violations of human rights could have a major impact on how both the civilian population in the theatre of operations and the populations of the engaged nations would perceive given military operations. This could ultimately influence or determine support for the military actions.

The rise of IoT and big data means that Krulak's point has only become even more relevant today. The digital footprint following the mass adoption of smart devices can be understood as huge volumes of different varieties of data generated and shared at the velocity of (near-) real time, and archived permanently in the huge archive that the Internet itself basically constitutes. At the same time, big data analytical tools (analytics) make it possible for civilians to access and process huge volumes of data on various military operations and to make them available to everyone on the Internet (Ford & Hoskins, 2022). This point has been greatly emphasized in the ongoing war in Ukraine, where Ukrainian and Russian civilians have collected huge amounts of data about the war through means such as videos and pictures taken on smartphones and later posted on social media. These, and vast amounts of other data, have been analysed by civilians who, both professionally and non-professionally, have provided vast amounts of OSINT and made their analyses and findings available to all (Smith-Boyle, 2022). This data has apparently had tactical and strategic importance (Burgess, 2022; Smith-Boyle, 2022). Tactically, Russian soldiers and civilians who have filmed and taken pictures of their own military installations and uploaded the images to various social media platforms have provided both civilian and military intelligence analysts with information and knowledge about them, their location, purpose, and so on. This has ultimately enabled Ukrainian attacks on these installations (Burgess, 2022). Strategically, the ability of Ukrainians to generate and share data/information from the battlefield and occupied territories on tactical victories, defeats, and human rights violations has seemingly had an impact on how the Russian and Ukrainian militaries have been perceived globally (Serritzlev, 2023; Smith-Boyle, 2022). These examples thus illustrate how the modern strategic corporal must be significantly better able to understand and navigate the strategic dimensions of war than the tactical leaders of the past.

However, the digitalization of the operational environment and the arrival of IoT, big data, and AI on the battlefield do not only mean that the actions of the tactical leader can have an increasingly strategic impact. Through various C4ISR capabilities, the tactical leader (embodied in the concept of the strategical corporal) now enjoys, also, increasingly great access to knowledge of what is going on at the operational and strategic levels; this might be knowledge of operations that other services or allied forces are undertaking, of logistics, or of civilian attitudes to a given military operation. In the past, tactical commanders only rarely, or to a limited extent, enjoyed access to such information, being restricted to communication by radio or physically meeting other units to exchange information by means such as drawing up maps. Today, such data can be shared in near-real time over battle management systems, enabling low-level decision-makers to access much more information (depending on the limits of information access as delineated in the battle management system). Increasingly, this means that tactical leaders – now able to know what is going on, both across geographical or temporal boundaries such as services or domains and across the different levels of warfare – have potential operational and strategic roles to play. This development is one of the cornerstones of the MDO/JADO concepts, which precisely underscore the expectation that the tactical commander relates to and applies this available (operational or strategic) knowledge by, for example, considering or requesting fire support from the air force or requesting a cyber or information operation.

While this can provide the tactical leader (the strategic corporal) with entirely new opportunities for making better and faster decisions, it can also lead to both information overload and information over-reliance (Kollars, 2021). "Information overload" describes the condition of having access to so much data/information that one does not know which of it to prioritize or how to derive meaning or insight from it. "Information over-reliance" describes a condition in which the military decision-maker becomes so overly dependent on the vast amounts of data/information generated from these new technologies that decisions derived from that data are made too slowly, or even not made at all (Kollars, 2021; Fuller, 2000). Both information overload and over-reliance lead to inertia and paralysis of action, and can ultimately result in the adversary gaining the decision superiority (Fuller, 2000).

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This is not only because there is so much information available; there are also so many issues about which information is now available that the span of what the tactical decision-maker must make decisions about has become significantly expanded. As a further consequence, tactical leaders must also increasingly use and rely on data and information that may at times have been collected and processed far from the battlefield in which the leaders themselves are situated. The tactical leader will therefore sometimes face the dilemma that the digital information or decision support at hand contradicts what they are experiencing and sensing on the battlefield (Heltberg, 2021). Thus, while the increased access to data may increase the tactical leader's situational awareness, it also creates a potential paradox: it risks creating a greater *cognitive* distance from the battlefield for a tactical leader who is by necessity *physically* close to this battlefield. This cognitive distance may be further exacerbated by the fact that tactical commanders often lack the specialized technological knowledge necessary to understand the new technologies and thus to fully grasp the opportunities and challenges they present (see Aspelund et al., 2021; Feige, 2020). Nor do they always know how the technologies can be applied. Tactical leaders must therefore use technologies that they often do not fully comprehend. One can thus argue, essentially, that the strategic corporal is largely underpinned by the expansion of the tactical leader's operational environment through the introduction of new knowledge technologies and associated concepts such as MDO/JADO.

THE TACTICAL GENERAL

The concept of the tactical general was coined by the military technology researcher Peter W. Singer (2009). The term describes the fact that knowledge technologies and general developments in command and control systems do not merely expand the operational environment for the *tactical* leader, as described in the previous section of this article. New technologies also enable *strategic* leaders to continually monitor what is happening on the battlefield in (near) real time and to see what the soldiers and tactical leaders in the field are seeing (Singer, 2009). This not only applies to *military* commanders; increasingly, senior *political* leaders can now also follow events in near-real time. This phenomenon was instantiated in the iconic 2011 images of the U.S. president Barack Obama and his staff watching the military action that resulted in the death of Osama bin Laden live from the White House (McGee, 2021). An important implication of this development is that, just as the strategic corporal has an increasing access to data about what is going on at the operational and strategic levels, the 'tactical general' can increasingly gain access to and knowledge of what is going on all the way down to the sub-tactical level. Combined with the fact that technological developments have already led to strategic leaders having access to ever more information, generally speaking, this access to real-time tactical level events and views means that the tactical general may also suffer from both information overload and information over-reliance (Kollars, 2021).

Another challenge still follows from this. On the one hand, technologies such as IoBT, big data, and AI make it possible for the tactical general to assume greater responsibility for tactical-level actions; it is inarguable that, at times, the commanding general might have a better view of a tactical battle than other actors involved (King, 2019; Shamir, 2011) and that these technologies may also improve the conditions for creating an even better understanding, throughout the chain of command, of the intent that the strategic leader has stated for a given operation. On the other hand, however, the new tactical knowledge made available to strategic commanders in real time fuels the risk that they will choose, at inappropriate or inexpedient moments, to micromanage right down to the tactical level, thus depriving tactical commanders of the possible initiative and creativity that might be necessary for their work (Johnson, 2022).

In this way, the diffusion of data and information across organizational crosslines and levels may undermine the premise for the principle of mission command: while mission command (as auftragstaktik) was invented to ameliorate the impossibility of getting an overview of the battle scene, new digital technologies may seem to hold the alluring potential to make the operational environment transparent again to all actors, thus eluding the fog of war. A central challenge, thus inherently intertwined with the potential of the new technologies, is how strategic commanders might seek to avoid losing focus in relation to their core tasks. These include ensuring the adequate operational or strategic understanding of the operational environment; making the necessary operational and strategic decisions; and motivating their subordinates to take the necessary initiative (NATO, 2019, par. 1.5).

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This also relates to another issue being debated in this regard concerning the extent to which commanders should be physically present on the battlefield (for the purposes of motivation and boosting morale, for instance), or whether they should rather be in headquarters where they can observe by use of BMS or other C4IRS systems from a safer distance (see Heltberg, 2021). As noted with the example of President Obama sitting in the Situation Room of the White House watching a military operation thousands of miles away in Northern Pakistan, digitalized knowledge management technologies now make it possible for commanders to have a lot of information about actual real-time situations on the battlefields without having to be physically present themselves. A central question arising, then, is that of whether professional judgment, the operational coup d'oeil, is still somehow dependent on physical presence, and if, when, and to what extent, it can be just as well informed and calibrated through data and pictures on a screen.

We will turn to this question in the section below, proposing and developing the two new concepts of digital mission command and digital coup d'oeil.

DIGITAL MISSION COMMAND AND DIGITAL COUP D'OEIL

The transformation of military knowledge brought about by technologies such as IoBT, big data, and AI is greatly impacting military practice at both organizational and individual decision-maker levels. The developments described in the MDO/JADO concepts and in the concepts of the strategic corporal and the tactical general come with a number of great potential benefits and serious risks alike. Realising these benefits and countering these risks requires, in particular, that relevant decision-makers thoroughly consider how best to deal with this emergent military epistemological transformation. In light of this development, there thus seems to be a general need for militaries to reconsider, rethink, and update some of their core concepts, even to introduce new ones altogether, in order for these concepts to adequately address and consider present and future operational and organizational challenges. Because, as noted by Schön (1963, p. 5), "concepts are seen as tools for coping with the world, for solving problems". But this does not entail groping blindly in the dark: we suggest, indeed, that two pre-existing and central concepts in Western military thinking – mission command and coup d'oeil – provide a unique foundation both for understanding important elements of this transformation and for systematically addressing some of the changes needed for military decision-makers at all levels to be able to act meaningfully in a digitalized operational environment.

DIGITAL MISSION COMMAND

As we have seen, the tactical general must avoid the risk of conducting detailed- or micro-management in situations where it is superfluous or inimical to more appropriate solutions. We should thus note that the digitalization and datafication of the military organization creates the danger that generals and other military commanders will be prompted to move from the exercise of mission command to that of detailed command, simply due to the opportunity presented by the radical extension of the volume of information available to them and, hence, extension of their span of control. Such development would not only affect specific military operations; if the strategic leadership is detailing and making decisions on behalf of tactical leaders (or strategic corporals), in the longer term these officers might become less skilled and practiced in taking initiative, exercising creativity, and making independent decisions (Johnson, 2022).

It is highly important to consider and examine this issue, specifically in view of the development of the role of the strategic corporal – an officer who must, precisely, be able to think and to act with unprecedented independence in relation to increasingly complex contexts, tasks, and decisions with potential strategic consequences. Furthermore, in light of conceptions of future battlefields as embedded in MDO, these battle spaces might be so disruptive and constantly changing that the need for extremely rapid decision-making is drastically increased. As the U.S. Army Field Manual 3-0 (U.S. Army, 2022, pp. 3–4) notes, "because uncertainty, degraded communications, and fleeting windows of opportunity characterize operational environments during combat, multidomain operations require disciplined initiative cultivated through a mission command culture." It is therefore imperative that the idea of mission command be re-examined and re-conceptualized by the military so that it may be adjusted to the digital

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reality increasingly characterising operational environments. This includes the need to create a general military culture marked by systematic reflection on when and how knowledge technology capabilities are used.

"Digital mission command" is thus understood here as the capacity to refrain from the general exercise of detailed control, notwithstanding the availability of knowledge technologies facilitating it, while retaining the ability to employ it when specifically deemed relevant and useful. This could, for example, be when new events or information prompt the senior military decision-maker to change overall operational or tactical objectives, or the desire to exploit the possibility of synchronising one's own decisions and actions with those of other decision-makers, exerting what could be called *digital operational art*. In most BMS and C4ISR systems today, it is possible to systemically define and restrict the information flow, both from the input side (i.e., to define and restrict *what* can be seen) and from the receiver side (i.e., to define and restrict *who* can see given information). Above, we proposed the concept of digital curation. In relation to the organizational development and management of digital mission command, this concept will have a central role to play.

DIGITAL COUP D'OEIL

The second concept we would like to propose is that of *digital coup d'oeil*.

The Prussian major general and philosopher of war Carl von Clausewitz wrote about the concept of coup d'oeil in his magnum opus *On War* (1832), a signally influential work in Western military thinking. For Clausewitz, the coup d'oeil was a specific ability, a form of military intuition that enabled the military decision-maker to make requisite and appropriate decisions even in an environment characterized by complexity, uncertainty, and chance (Clausewitz, 1832/2021, p. 62).[2] He refers to the concept in the context of his understanding that, since war is so greatly characterized by uncertainty and chance, data and intelligence will necessarily be founded on a degree of uncertainty rendering it incomplete or even entirely wrong.

Digital coup d'oeil, the concept proposed here, denotes the military capability or intuition needed to make decisions in complex environments, which (unlike in Clausewitz's time) are characterized by the availability of incalculably large amounts of information and equally large possibilities for combining, processing, using, and sharing this information. Digital coup d'oeil is the ability to mediate the challenges and to seize the opportunities resulting from the massive amounts of data arriving with the introduction of knowledge technologies into the operational environment, thus avoiding information overload and information over-reliance (see Kollars, 2021; Fuller 2000).

Another challenge accompanying the introduction of knowledge technologies is that technologies such as IoBT, big data, and AI are relatively complex and often require a high degree of specialized knowledge, both in their development, and in understanding their potential and their uses (Feige, 2020). This can render it difficult for military practitioners without a background in data technology to understand exactly the opportunities and challenges these technologies present – or, in other words, to understand fundamentally what they can and cannot be used for (Bollmann & Jacobsen, 2023; NATO, 2019). This not only means that it can be difficult to understand how and when to apply these technologies; it can also result in a lack of confidence regarding what these technologies are trusted to do, including in relation to decision support. Conversely, if equally undesirably, it can also create an over-reliance on these technologies, perceiving them to be a silver bullet capable of solving all problems and providing the military decision-maker with something akin to omniscience (see, for example, Serena & Clarke, 2019). A lack of strategic and practical knowledge and a lack of understanding of the potential and limitations of technologies can lead to the organization and its processes being restricted to analogue approaches with digital support, failing to successfully exploit the opportunities that the technologies actually offer (see Heltberg, 2021).

Digital coup d'oeil is the ability to know when it is appropriate to use these technologies for the collection, use, or sharing of data, and the ability to understand, perhaps almost intuitively, when

2 Clausewitz himself offered two basic definitions of the term, both as the faculty of "an intellect which even in the midst of … intense obscurity is not without some traces of inner light, which leads to truth, and then the courage to follow this faint light" and "the rapid discovery of truth which to the ordinary mind is either not visible at all or only becomes so after long examination and reflection" (Clausewitz, 1832/2021, pp. 63, 63f).

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to delegate decisions to subordinate actors, both human and (increasingly) non-human, thus avoiding detailed command and micro-management. It is also the capacity to understand and to act in such operational environments, as described in MDO/JADO concepts, where military categorizations and terms that have characterized Western military thinking for almost 100 years are changing. Thus, digital coup d'oeil helps to avoid action paralysis and inertia. Digital coup d'oeil will have different compositions depending on the level of the decision-maker – that is, depending on whether you are a strategic corporal or a tactical general. For generals, the digital coup d'oeil is not merely oriented towards the tactical level, as it equally concerns the ability to comprehend the various premises for how the military organization understands the possibilities and risks inherent to specific knowledge technologies. This is important if the military organization and its members are to be enabled to exploit these technologies and their potential, relevantly and constructively. In other words, strategic leaders must also be able to understand and translate technology demands and requirements for the military organization. The tactical general must be able to capture the new and to interpret and extract what this means for both present and future battlefields. The digital coup d'oeil thus also includes the ability to understand both the technological landscape of given conflicts and operations and the technological navigation parameters that are, or will become, essential in the future.

As an important observation, we will conclude by drawing attention to the fact that the digital coup d'oeil also concerns how one relates to the very fact that these digital and technological possibilities exist in the first place. We can use an analogy to describe this. The historical accounts of the development of the first automobiles in the late 19th century describe how, initially, these were largely developed within a mental conceptual framework that was still "horse-plus-cart." On the arrival of the engine, it merely became "cart-minus-horse" (Vlaskovits, 2011). It was not until 1891, when the French inventor Levassor changed the design of the automobile by placing the engine in front of the driver's seat, instead of under it, that engineers began thinking in earnest about cars in a different framework – that of the car itself (Morello, 2022). This change in basic understanding and mental framing became crucial for the development of the motor vehicle. Only when engineers were able to think of the car as something radically new and *qualitatively* different, with its own possibilities and premises, were they able to develop it to a new and greater potential (Morello, 2022; Vlaskovits, 2011).

Similarly, one could perhaps say about digitalization, datafication, and the understanding and application of Io(B)T, big data, and AI in the military operational domain, within the MDO framework: as long as we consider these phenomena merely as a new knowledge format or simply as a larger conglomerate of domains to include and manage, we remain in a kind of cognitive "cart-minus-horse" framework. To allow knowledge technologies to drive the military organization and military operations, data and emerging technologies must be viewed as a resource in entirely new ways and in entirely new constellations throughout the organization.

To help us imagine how we can do this, we might build on the concept of *affordance* as developed by Gibson (1979). Affordance means that the quality or property of an object defines its possible uses, or makes strong suggestions as to how it can or should be used: a glass, for example, affords us relatively uncomplicated drinking. Stretching the notion of affordance into the realm of communication, we find concepts and words that we are so used to thinking about in specific ways that we may consider them "affording us something." In a military context, the notion of *deep battle* may, for instance, often connote the use of artillery or air force. But there is no rule about this. We might also use other assets for deep battle – just as there are no rules stipulating that glasses can be used only for drinking, or that we should necessarily drink by using a glass. These are issues of affordance.

If we are to think of MDO – and the comprehensive datafication and use of emergent and disruptive technologies that the concept is founded upon – as something *qualitatively* different from what we already know, we also need to reconsider, reframe, and *re-conceptualize* our considerations of organizational, conceptual, and "objectual" affordances. Military leaders must ask themselves questions such as: "How would things be different if we changed the fundamental conceptual boundaries and demarcations that we habitually use for perceiving the world and framing our analyses?"; "What are the implications for professional judgment, ethics, and identities when military practitioners and leaders must collaborate with algorithms in decision-making?"; and "What are the changes brought to the expertise of the military profession change by algorithmic mapping and prediction?"

CONCLUDING REMARKS

The article has considered the pervasive and disruptive impact of digitalization and new technologies such as Io(B)T, big data, and AI, and the consequences for military organization, operations, and command. Based on this, the article has argued that militaries need to reconsider, rethink, and update their conceptual vocabulary in order to be adequately able to grasp and address challenges and opportunities that come with this development. The article has suggested two such conceptual developments in the concepts of digital mission command and digital coup d'oeil.

To acquire an organization-level digital coup d'oeil, both corporals and tactical and strategic generals must be able to think of digitalization, technology development, and MDO as something *qualitatively* different and entirely its own. Only then will the military be able to navigate and shape its organization adequately and to train its practitioners to act, manage, and respond in manners most conducive to the seizing of opportunities offered by the advent of knowledge technologies. This training should include attention towards the contingent, holistic, and integrative dimensions of the new organizational and contextual orderings. It should also, it is suggested, include the development and refinement of both organizational digital mission command and the digital coup d'oeil of military decision-makers. This requires cognitive and organizational flexibility – a constant readiness to shift mentally from "cart-minus-horse" to "car."

There will probably always be human and organizational delays when making such shifts. These delays can be important to qualify whether something should be considered radically new, offering radically new opportunities, or whether it can be understood and meaningfully contained within existing mental and organizational frameworks. However, history, and not least current geopolitical developments, also demonstrate that the shorter the delay (i.e., the faster our officers, leaders, and military practitioners are able to make and qualify such cognitive shifts), the faster the defence organizations can perceive and exploit new technologies, domains, opportunities, and challenges.

For Clausewitz, inspired by German idealism and romanticism and philosophers like Hegel and Fichte, the coup d'oeil was mostly innate and possessed only by great commanders or geniuses such as Frederick the Great and Napoleon (Cormier, 2014). He did, however, believe that the ability could be acquired or approximated to some extent. Whether this is the case, and whether it is also the case with what this article refers to as digital coup d'oeil, is a larger (military) discussion not addressed here.[3] One interesting perspective is given by Trent Lythgoe (2023) in an article in *Military Review*. Lythgoe argues that the concept of *adaptive expertise*, borrowed from cognitive psychology, may provide the missing conceptual starting point for a systematic approach to understanding and developing coup d'oeil in today's officer corps. While it is beyond the scope of this article to develop these ideas further, the notion of digital coup d'oeil as a specific form of adaptive expertise seems promising.

What *is* certain, however, is that military decision-makers, whether strategic corporals or tactical generals, will increasingly be forced to make decisions in complex environments characterized by access to knowledge technologies and overwhelming amounts of data. It is therefore imperative that military organizations consider how to nurture the skills or intuition referred to here as digital coup d'oeil. The generations now entering the military are often referred to as "digital natives": that is, with digital knowledge technologies having been an integral part of their lives since birth, the operation of these technologies is supposedly second nature to them. While this has a number of inherent advantages, including "digital intuition," it may also mean that they struggle to make decisions without digital resources. It is also worthwhile noting that notions such as "being critical" or "taking an ethical stance" towards data and its inherent opportunities and risks might have different perspectives for these generations. One might thus be cautious of the fact that the digital skills that these generations possess may, nevertheless, continue to differ from those needed for critically, reflectively, and creatively managing military operational needs in complex, hybrid threat landscapes.

3 King (2019) has, for instance, suggested that a radical change in the perception and practice of command from individualistic to a collective has taken place since the 20th century; see also Friedman (2021) and Klitmøller & Obling (2021) for commentaries on King's book. Further discussions on this issue can also be found in recent works on the notion of "operational art"; see, for example, Friedman (2021); Olsen and Van Crevald (2011).

The private business sector might be a source of inspiration, where companies are increasingly demanding and training so-called data analytics translators (Feige, 2020). These are people possessing both a deep technological understanding of the opportunities and limitations of the new knowledge technologies and a strong domain knowledge of the specific company in which they are employed. Wrigley (2016) describes something similar concerning the ways in which "design innovation catalysts" manage to take on the role of "transitional developers," translating between the abstract field of expertise, including the research underpinning developments in the specific field, and the reality of practice (Wrigley, 2016; see also Heltberg & Dahl, 2019). Such military "data translators" would be able to provide both understanding of the opportunities these technologies offer and insight into the areas where they are not useful, advising military decision-makers on developing and strengthening the digital coup d'oeil of the organization and its practitioners (Bollmann & Jacobsen 2023; Feige, 2020). Clearly, however, there is no single solution to these challenges, and there will be expensive lessons to be learned as these knowledge technologies come to define both the military organizations and the operating environments of the future.

COMPETING INTERESTS

The authors have no competing interests to declare.

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