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ADVANCED WEAPONRY AND RUSSIAN MILITARY ART OF WAR

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Executive Summary

Russian General Staff Chief Valery Gerasimov has directed that the Academy of Military Science provide insight into new forms and methods of warfare, including in military art. In its simplest form, Russian military art is the development of recommendations for the application of military and nonmilitary actions. Military art changes in accordance with contemporary developments. Proof of this statement lies in the various and unexpected ways that Russian forces can now disorganize an opponent's command and control systems, are developing strategic aerospace axes for deep operations, are considering new forms of maneuver and geophysical weaponry, and are developing new applications of electronic warfare and military stratagems. In addition, Russian military art avoids stereotyping; that is, formal concepts such as airland battle or multi-domain operations (MDO), which along with several other items has serious implications for commanders of MDO to take into consideration.

An expanded discussion of all these issues make up this report.

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Introduction

Russia has long recognized that military art is undergoing enormous change. In 2001 Major General (now deceased) Vladimir Slipchenko offered thoughts on new-generation warfare. In 2015 S. G. Chekinov and S. A. Bogdanov, two prominent Russian military theorists, indicated that advanced forms of warfare, including advanced information technologies, remote noncontact operations, etc., were becoming the chief methods of military operations. They added, "Under these conditions differences among strategic, operational, and tactical levels [that is, military art] will be obliterated, as will the difference between offensive and defensive activities."[1]

Russian General Staff Chief Valery Gerasimov stated this exact notion two years earlier in his 2013 presentation at the Academy of Military Science. Gerasimov preceded his statement with questions of his own: What is contemporary war? For what must the armed forces be prepared? How should they be armed and what forms and methods of their employment should analysts envisage? Gerasimov asked members of the Academy to conduct research in these areas to help answer his questions.[2]

The report below offers some results from Russian analysts who supported Gerasimov's request to develop new ways of thinking about military art. The findings of the Academy's research along with that of members of the General Staff Academy and others have significant implications for the US concepts of operation, such as Joint All Domain Operations (JADO).

The report begins with a brief discussion of Russia's understanding of the laws of warfare. That analysis is followed by an examination of specific and important subcomponents of military art (disorganization concept, space as a warfighting theater, initial period of war, maneuver, long-range strike, indirect warfare, stratagems, geophysical weapons, and modeling operations).

The conclusion reached is that military art is rapidly changing due to new weapons capabilities and how they (and the concepts [maneuver, deep operations, etc.] exploiting their use) are being reflected in the principles of military art (PMA). These weapons and concepts will impact how contemporary war may start, be conducted, and finish, and will impact the emerging JADO concept.

THE CONCLUSION REACHED IS THAT MILITARY ART IS RAPIDLY CHANGING DUE TO NEW WEAPONS CAPABILITIES AND HOW THEY ARE BEING REFLECTED IN THE PRINCIPLES OF MILITARY ART.

Five appendices are offered. The first offers two discussions of current and past correlations among strategy, operational art, and tactics, demonstrating that the PMA change. The second offers diagrams of maneuver types from a 2019 Military Thought article, thoughts that could also apply to space maneuvering. The third appendix offers a diagram as to how Russia classifies military conflicts. The fourth appendix offers a few official definitions associated with military art and lists Russian articles on the "disorganization" concept from 2016 to 2020. The fifth appendix offers definitions of military art and principles of PMA, along with the views of four prominent Russian military experts on changes in military art.

Russian Understanding of the Laws of Warfare

Military art is the reflection of two processes, Russian theorists write, the objective laws of war and armed struggle, and the subjective and creative activity of leaders. Thus, this report must begin with a simple and short explanation of the laws of war. It covers a commander's creativity later in the discussion.

Russia's military encyclopedia explains that the most general laws governing warfare "are the laws of the dependence of victory or defeat in war on the correlation of material and spiritual factors and the political aims of the belligerents (their economic, social, moral-political, and military strength, among others)."[3] Wartime laws are in effect only during war and permit requisitioning and commandeering, labor mobilization, and the impressment of civilians to perform various duties. Laws and customs of war are represented by the aggregate of moral and legal provisions in international law, including the 1899, 1907, and 1954 Hague Conventions; the 1925 Geneva Protocol; and the 1949 Geneva Conventions.[4] The knowledge reflecting the laws of war is integrated in the PMA and it is in these principles where a leader's creative activity is found. Thus, the laws of warfare can, simultaneously, be considered as reflecting principles of military art.

Updating a Few Military Art Specifics: Disorganization Concept, Space as a Warfighting Theater, Initial Period of War, Maneuver, Long-Range Strike, Indirect Warfare, Stratagems, Geophysical Weapons, and Modeling Operations

Several recent conflicts have influenced military art in Russia. They include Russian lessons learned and knowledge gained from combat experiences in Chechnya, Georgia, Ukraine, Syria (especially the testing of robotics and weapons under combat conditions), and now Libya as well as through the close scrutiny of US lessons learned in the fighting in Afghanistan, Iraq, and Syria. Military art is affected as well when US and NATO weaknesses are uncovered and ways to exploit them advanced. When placed side by side with the implications of the changing nature of warfare (speed, agility, reach), there is abundant evidence that military art is being affected by numerous internal and external criteria. Some of the specific ways that military art is being affected are summarized below.[5]

Disorganization Concept

Disorganization, a most important new element of military art: The disorganization concept is an aspect of Russian military art that is often overlooked in Western commentaries. Russia's armed forces aim to disorganize an opponent's information, command and control, electronic warfare, and robotic systems, and Russian theorists write about this openly. Disorganizing an opponent can also originate from simply denying global positioning signals to an opponent's equipment. Disorganization prohibits opponents from integrating operations and ensures chaos in the organization of combat affairs.

The concept of disorganizing information operations was advanced by other Russian scientists as early as 1995 at conferences in Moscow that this author attended. Authors S. G. Chekinov and S. A. Bogdanov noted in 2011 that strategic information confrontation "plays an important role in disorganizing military and state control and the aerospace defense system, in deceiving the enemy, creating the desired public opinion, organizing antigovernment protests, and other undertakings aimed at reducing the other side's resolve to resist."[6]

In 2017, in the *Journal of the Academy of Military Science,* author P. I. Antonovich noted that one of the principal tasks when creating a strategic radio-electronic warfare (REB) system for Russia's Armed Forces would be "the comprehensive disorganization of the operations of a potential enemy's systems of state administration and military command and control in the integrated information domain."[7] This would include the command and control of an opponent's troops and weapons.

Major General Yuriy Lastochkin, who is in charge of the Defense Ministry's REB force,[8] stated in 2018 that REB's men and equipment will permit them "to decide the fate of all military operations" in the near future.[9] REB will be used to disorganize an adversary's command and control capability. The military is experimenting with REB maneuver units and has requested that each REB brigade develop a disorganization plan for confronting an opponent's use of command and control issues. Lastochkin stated that the disorganization of enemy troop and weapons command and control and the reduction of the effectiveness of the conduct of reconnaissance and weapons employment by them "is the primary goal of the conduct of electronic warfare."[10]

In 2019 Russian analysts proposed a methodology for the operational calculations that determine the effectiveness of disorganizing command and control under fire, REB, and other types of destructive effects. First, the real strength of the enemy's army formation is computed. Second, the efficiency of disorganizing control over enemy troops requires the preparation and implementation of measures that impact the functional elements of an opponent's systems and rupture control over troops, weapons, electronic warfare, and reconnaissance capabilities. Control disorganization efficiency reduces strength indices. Three ways that control can be disorganized are when it is disrupted, upset, or utterly disabled.[11]

A RADIO ELECTRONIC WARFARE SYSTEM WILL BE USED TO DISORGANIZE AN ADVERSARY'S COMMAND AND CONTROL CAPABILITY.

In 2020 Russian authors discussed ways to disorganize the control systems of robotic means in foreign armies. A model organization was developed for the preparation of REB specialists to disorganize such systems.[12] Thus the disorganization concept is one for MDO proponents to study closely and protect US systems against.

Forms of REB in military art: "Forms" answer the question of how operations are organized.[13] Forms of REB forces are applicable to peacetime, a period of direct threat of aggression, or wartime.[14] Twelve forms of REB were discussed in a 2019 article, offering new ways to consider the application of REB. Each is followed by a simple explanation of the form in question, and all may be used in conjunction with strategic-operational or operational-tactical considerations:

1. Radio-electronic (RE) protection of structures and troops: protects weapons, military equipment, military structures, and troops against technical intelligence and targeted strikes.
2. RE-strike: short, powerful RE damage to an opponent's RE apparatus or their suppression and to software employed in technical intelligence sources.[15]

3. RE-fire strike: used with the forces and means of Aerospace Defense and Missile Defense large formations, classified as the number of resources enlisted, time of delivery, priority of destruction, tasks being resolved, or type of destruction or suppression.[16]
4. RE battle: uniform concept and plan (usually for a short time) for the purpose of RE damage to RE apparatus and software, or their suppression.
5. RE-fire battle: totality of RE-fire strikes conducted by REB and large formations of the Aerospace and Missile Defense.
6. RE blockade: the radio isolation of encircled enemy large formations and diversionary and reconnaissance groups or the disruption of their external communications for a long interval of time.
7. Radio curtain: the creation of massive radio interference in a specific range of frequencies of an opponent's RE resources.
8. RE disinformation: creation of active and passive false RE targets and information resources for misleading an enemy's technical intelligence.
9. RE camouflage: concealment from enemy technical intelligence of RE targets and information resources.[17]
10. Electronic attack: coordinated actions against an information-telecommunications system for command and control of troops and weapons.
11. RE-psychological strike: short, powerful effects against sensory organs and the bodies of servicemen by microwaves, light, and sound.
12. Surveillance: comprehensive technical control of a large formation, regarding the control of emissions of artificial and natural origin, arising from the employment of weapons, and so on.[18]

Space as a Warfighting Theater

Deep Operations, Space Theater of Operations (TVD): In 1985 Russian General of the Army Makhmut Gareyev stated that an outstanding achievement of Soviet military art in World War II was the elaboration of the theory of deep operations, a concept that emerged from changes in the nature of armed combat. Today, when the nature of armed conflict is characterized by weaponry's speed and reach, deep operations have acquired serious consideration because they can strike anywhere on earth almost instantaneously and without warning.

Russian specialists recognized these changes in war's character early. In 2011 Gareyev stressed that the nature of armed struggle had changed so radically that a conflict's center of gravity and efforts had shifted to the aerospace domain, a position later backed by Defense Minister Sergey Shoygu. Aerospace campaigns, consisting of space and air operations, must be planned before war breaks out, Gareyev noted, and should be implemented at the very beginning of a conflict.

The course and outcome of war and a country's fate can depend totally on thwarting such aerospace attacks, making aerospace defense the main mission of Russia's Armed Forces. Gareyev called for a Strategic Command for Aerospace Defense within the General Staff structure as an operational control element, adding that the organization's missions indicate "one can already speak of an aerospace theater of military operations (TVD)." He added that missions can be accomplished from remote basing regions.

In 2018 the *Journal of the Academy of Military Science* carried an article on space zones. It noted the following, which continues Gareyev's 2011 focus:

> The appearance and development of space weapons has resulted in the emergence of the concepts "strategic aerospace axis," "strategic space zone (SSZ)," and "space theater of military operations," which reflect the view of near-earth space as a new sphere of armed struggle.[20]

The authors noted that there are three operational space zones (OSZ), determined by altitudes. They are from 100 km to 2000 km (near OSZ), 2000 km to 20,000 km (mid OSZ), and greater than 20,000 (distant OSZ). Orbital resources in the operational space domain are allocated as follows: 48 percent to geo-stationary and quasi-stationary orbits, 36 percent to low orbits, 10 percent to highly elliptical orbits, and 6 percent to mid-altitude orbits.[22] It was further noted that:

> From the point of view of international law, the basic feature of the space domain is its extraterritoriality: in accordance with the Treaty on the Principles of Activities of States for the Exploration and Use of Space, including the Moon and Other Celestial Bodies, the space domain "is not subject to national appropriation" by declaring national sovereignty in it. This circumstance makes it possible for states to implement detailed reconnaissance and other activities from space, which is excluded with respect to the airspace over the territories of other states.[23]

Operational art is being taught at the Aerospace Academy in Russia, where satellites naturally are one of its main maneuver components. This implies that Russian analysts understand the configuration of contemporary deep operations, which now imply the use of operations anywhere on earth. Satellites provide the reconnaissance and precision capabilities required for modern warfare. New forms of military operations in near space can be expected to block and defeat orbital alignments of forces while suppressing radio communication systems in specific areas. One recent example trumpeted by Russian President Vladimir Putin is the Peresvet ground based laser that is designed to blind US satellites tracking mobile intercontinental ballistic missiles.

Satellites, due to their ability to maneuver and move singularly or in swarms, could be capable of acting as operational maneuver groups (OMGs) in space. A contemporary space OMG would potentially consist of reconnaissance-strike units, satellites of various types, counter communication units, and other assets combined into a single organism. What plans are under consideration at the Operational Art Department at the General Staff Academy using these assets in a space TVD are unclear. Gareyev stated that even though OMGs were liquidated with the fall of the Soviet Union they will "obviously be used in some form or another" in the future.[24]

Initial Period of War

Over a decade ago it was noted that a principal conclusion regarding war's experience is that warfare's nature and control is so exceptionally complex and fast that preparing in advance all command and control agencies and troops has become mandatory. In the past it was possible to learn as wars were being fought. This is unlikely in future high-technology wars. Russian analysts know that one of the most important and difficult tasks is to foresee not only the possible nature of future war but also an aggressor's actions at the very outset of a war. It is equally difficult to prepare friendly force combat readiness for a multitude of potential attacks (nuclear, cyber, recon-strike, asymmetric, etc.) and to consider which strategic deployments might

best thwart an opponent's initial attacks and help friendly forces gain a strategic initiative before warfare begins. Underestimating these changes can result in severe consequences to the more passive side. The consideration of surprise attacks to disorganize both locally (command and control) or globally (homeland infrastructure) cannot be discounted in an era highlighted by the increased capabilities of electronic and cyber warfare preemptive capabilities. An opponent, whether it be Russia, China, or Iran, will do everything convenient and advantageous for its leadership. Further, the speed of contemporary operations may not allow for the attacked side to recover if the initial assault is overwhelming. One's freedom of maneuver may evaporate. Thus, the initial period of war has increased dramatically in importance and planning.

Maneuver

Fifty years ago, in an article in *Military History*, Russian General Major A. A. Strokov noted that the character and methods of maneuver in the attack were tangibly changing. Rapid advances into the depth of an opponent were advocated instead of just moving to a more favorable position.[25] One can only imagine Strokov's thoughts today in an age of hypersonic weaponry. In 2008, in one of many articles on maneuver in the interim, it was noted that the evolution of the principle of maneuver was growing, involving an array of aviation, sea-based, and air-based cruise missiles; naval forces; remotely piloted vehicles; reconnaissance-strike and reconnaissance-fire complexes; and aerial space equipment. Another new type of maneuver was by means of electronic countermeasures and the use of the ethereal medium.[26]

In 2018 A. I. Kalistratov discussed maneuver in the context of both the 1971 and 2008 discussions. He noted that maneuver can quickly change a battlefield situation and achieve surprise. It can be planned or carried out spontaneously. **Operational art maneuver** implies troop transfers to new sectors to take advantage of openings and create a necessary grouping of troops, indicating it can be performed during a fight. **Strike and fire maneuvers** consist of concentrating resources on adversary facilities and transferring them to new targets or dispersing them over several targets. **Logistical maneuver** consists of moving or handing over material means to troops fighting in the main sector.

Operational maneuver was defined as follows:

> This is a maneuver by troops, forces, combat assets, strikes, fire, and reserves of material-technical means on the scale of operational formations in order to take a more advantageous position than that of the adversary, concentrate efforts in major sectors, improve or restore the combat efficiency of certain troops (naval groupings), remove them from the range of adversary fire, transfer efforts from one sector to another, repulse a surprise action by the adversary, and solve other problems during preparation of all kinds of operations and in the course thereof.[27]

Operational maneuver can include the following strike and logistic examples:

- Concentration of nuclear and fire attacks delivered by missile forces.
- Attacks of aircraft or artillery groups on adversary troops that are the most dangerous at the moment or in the interests of exploiting main group successes.

- Transfer of weapon attacks to adversary targets of operational significance that have emerged.
- Transfer of one or several formations from the depth or passive section to sectors where success has been attained or to critical points of the operational formation.
- Concentration or redistribution of logistical forces and assets.[28]

There was an extended discussion of the "form" of maneuver as well. The form of an operational troop maneuver was defined as a configuration of the troop (force, asset) movement direction conditioned by the maneuver purpose during an operation and the method of doing so. Offensive troop maneuver "types" are frontal, flank, concentric, and air. "Forms" of frontal maneuver are dissection and operational raids; forms of flank maneuver are severance, operational envelopment, and operational bypasses; forms of concentric maneuver are encirclements; and forms of air maneuver are severance, airmobile raid, vertical envelopment, and vertical bypasses[29] (see Appendix Two for illustrations of dissection, severance, and encirclement attacks from Kalistratov's article).

The officially acknowledged troop maneuver "forms" in the defense are retreat and withdrawal. Actual combat experience suggested to Kalistratov that there are more forms of operational troop maneuvering than is alleged in official military theory in Russia, and so he discussed other forms.

Defensive types of troop maneuver are the same as for offensive maneuver (front, flank, concentric, air). Frontal forms of maneuver are retreat, withdrawal, and frontal advances; flank forms of maneuver are operational lateral movements; concentric forms of maneuver are concentric advance and concentric withdrawals (concentric maneuver was said to even out the correlation of forces and assets in adversary attack sectors, and it was Clausewitz who said this maneuver was the soul of defense);[30] and forms of maneuver by air are severance, airmobile raid, airmobile lateral movement, and airmobile retreats.[31]

The author concluded by stating that "in present-day conditions it was noted that when conducting both offensive and defensive operations, virtually all forms of the operational maneuver can be used."[32] However, operational maneuver today is "practically impossible unless superiority of the adversary in the air has been neutralized."[33]

WHEN CONDUCTING BOTH OFFENSIVE AND DEFENSIVE OPERATIONS, VIRTUALLY ALL FORMS OF THE OPERATIONAL MANEUVER CAN BE USED.

Long-range Strike

Long-range fire destruction, including rocket forces, artillery, and aviation, is determining combat potential. In 2017 an article in *Armeyskiy Sbornik (Army Journal)* noted that the contemporary state of military art's development has become characterized by a "substantial increase in the role and place of fire destruction of the enemy."[34] A new generation of conventional weapons indicates that arithmetical superiority (the quantitative correlation of forces) no longer creates "decisive prerequisites for defeating an enemy," since the qualitative component dominates the quantitative component.

A correlation of forces change also occurs in a shift from the targeted destruction of an area to the destruction of a specific target.[35] The planning and implementation of fire destruction will most probably be the zonal-targeting method, and the main form of employing forces will be according to a maneuver-fire design. One of the new forms of fire destruction is recce-fire methods and operations. The recce-fire method of operations for artillery formations is defined as follows:

> Operations of forces and means of reconnaissance, automated command and control, and fire destruction, coordinated with respect to targets, tasks, place, and time, for effects against the most important and high-mobility enemy targets, including direct laying fire. These operations are to be implemented in real time, according to the principle of 'reconnaissance-hit.'[36]

A short statement about fire destruction ended the article, noting that "The need to create artillery groupings (army artillery groups, division artillery groups, brigade artillery groups, etc.) will disappear, because the recce-fire resource itself envisions the effective selection for the means of destruction."[37]

An Indirect Approach

Authors Chekinov and Bogdanov wrote on the indirect approach in 2011, noting that it uses a variety of forms and methods of indirect military and nonmilitary means, such as information, remote (noncontact) confrontations, and polycentric, electronic, fire-based, land-sea, aerospace attack, and antisatellite operations. They stated that the concept is so important that Russia must "map out and eventually also implement a strategy of the indirect approach as its state strategy without an alternative."[38] Moreover, they wrote that the term "nonmilitary means" shows an affinity for the indirect approach concept.[39] Nonmilitary means, when there is strife among states, was defined as "a combination of state and social institutions (organizations), political, legal, economic standards, spiritual values, general-purpose information, and technological systems" that are used to influence internal and external relations between states.[40]

In 2019 Colonels A. S. Fadeev and V. I. Nichipor updated the concept of indirect actions. They noted that warfare nowadays is never declared or finished. The ongoing scenario is that a threat has emanated from a victim state, followed by a vigorous information campaign, and ending when a coalition of interested states is formed to achieve the victim state's goals.[41] Efforts such as attempting to ruin a country through the destabilization of that nation's economy are a type of approach that has been named indirect. Their essence is covert effects that foment internal contradictions in states. Third forces (countries, blocs of states, international entities, transnational companies, extremist organizations, political forces inside the state, etc.) are used to conjure up contradictions and provoke parties into armed conflict.

The real role of third forces (interests, objectives, etc.) includes campaigns against human rights violations, accusations of tyranny, demonstrations for more democracy, and so on. Of interest is that the authors used a 2015 diagram and several statistics (without citing them) from the Journal of the Academy of Military Science that A. V. Kartapolov authored. The latter's diagram has been widely disseminated over the past several years in Western nations describing the evolving nature of war.[42]

The leadership and population of a victim state falling to indirect actions often do not realize what is happening. A clandestine external invasion takes place while simultaneously nongovernmental organizations and those advocating humanitarian rights enter as well.[43] The authors stated that indirect operations help attain military results without the overt employment of the armed forces.

Results can include demoralizing an adversary and inflicting economic, political, and even territorial damage.[44]

Equating indirect actions to asymmetric ones, the authors added the following:

> A most important condition of efficient asymmetric actions is pinpointing precisely the most vulnerable and weak spots of the adversary, its critically important strategic targets, which, if hit, will have maximum effect with minimal expenditure of one's own forces and resources … However, it does not appear possible to work out a universal set of asymmetric actions for all likely conflicts, because each has its own specific features.[45]

Gareyev, who also supports the use of indirect operations, noted that using asymmetrical means and methods in space using electronics and other means could reduce enemy advantages in communications, navigation, reconnaissance, and command and control. Space, in Gareyev's 2013 estimation,[46] is where the US has its greatest weakness due to its overreliance on the domain.

In early 2019 the journal *Military Thought* published an article on asymmetric ways to combat high-tech adversaries. Asymmetric responses were defined as nonstandard methods that find the weakest links in an opposing troops' weapon systems and infrastructure, and inflict selective, precision damage on them. An asymmetric response will surprise an opponent.[47] Nine methods were offered:

- Apply a systemic approach that examines all four hierarchical levels (national security, strategy, operational art, tactics) when addressing asymmetric responses.
- Maintain scientific and technological independence, refusing to use foreign technologies.
- Seek out weak points in an adversary's strike and defensive systems and complexes.
- Reject symmetric interventions and develop original asymmetrical measures to cause maximum damage to adversary troops and infrastructure that disrupt command, information support, and navigation. Fire assets that destroy adversary targets are five to ten times less expensive than the cost of active means of protection.
- Perform feasibility studies on asymmetric weapon systems that cause a certain military-economic damage to an adversary.
- Set military-technical traps for adversaries, leading them to unpromising areas of research and development.
- Foster competition among inventors to design breakthroughs in asymmetric systems.
- Provide strategic planning and program-targeted technological support for asymmetric weapons.
- Use time and cost efficiency as criteria for assessing the development of asymmetric weapon systems.[48]

The authors offered one example, the Mozyr active protective system (APS), an antimissile artillery weapon. The system is proclaimed to be able to intercept intercontinental ballistic targets and other types of modern high-precision weapons, such as cruise missiles, using nonnuclear assets at low altitude. The APS "includes radar detection and guidance systems, as well as special gun mounts." It engages with metal arrows and balls with a diameter of 30 mm at altitudes up to 6 km, firing at an initial speed of 1.8 km/s, comparable to a long-range cannon projectile. The system creates an "iron cloud" that in one salvo can release "up to 40,000 items."[49] The APS appears to offer two asymmetric advantages. First, it combats missiles with essentially "buckshot" (not the usual symmetric use of missiles against missiles). Second, it would be less costly and could cause some military-economic damage to an adversary that continues to utilize more costly options in the confrontation.

Stratagems

The common Russian terms when deceiving an opponent are maskirovka and reflexive control, about which much has been written. Another term to consider is usually associated with Chinese operations: stratagems. Former General Staff Chief Vladimir Lobov noted in 1992 that Russia defines military stratagems in the art of war as the theory and practice of concealment and deception of the enemy. Concealment is a set of measures to remove or reduce signs typical of troop presence to make it difficult to detect and identify them and the direction of their activity, thereby creating conditions for surprise. Deception consists of forcing on the enemy incorrect ideas about objectives and preparations, and the nature, forms, methods, techniques, and conditions of operations. Military stratagems, Lobov adds, are the essential condition or *sine qua non* for surprise in troop operations. Stratagems represent the sum of general and specialized knowledge. Skill and expertise can be reduced to subjective orientation that considers its own special form of creativity based on innovation. It is further advanced if an opponent is unprepared for the unexpected. To thwart the unexpected Russia must fight against its own subjective disorientation and psychological unpreparedness for surprise enemy actions.[50]

In 2013 another Russian author discussed stratagem use in "Modern War in Terms of Stratagems." While not conclusive evidence that Russia still uses the term, it indicates that the nation pays attention to how stratagems might be employed as an element of military art. Author V. Tatarinov quoted Clausewitz as noting that stratagem can be of service as the only anchor of salvation to the weak side in a confrontation. He then went on to divide the Chinese book 36 Stratagems into eight subgroups. Only stratagem 19 is discussed here for its applicability to contemporary events.[51]

Stratagem 19 concerns how to disempower an opponent ("pull out the firewood from under the boiler"). The goal, Tatarinov notes, is to deprive an opponent of internal support (ideological, economic, religious, demographic, etc.); to exacerbate internal interethnic and religious conflicts, keeping them smoldering, inasmuch as their inflation or attenuation is disadvantageous; to foist potential border conflicts upon the opponent; and to deliver surgical strikes against national interests in zones of influence.[52]

Geophysical Weapons

This type of weapon appears to offer an asymmetric method for causing harm to human life or for inflicting significant material damage. A geophysical weapon is defined in the following manner:

> Geophysical weapons should be understood to mean the weapons in combat employment capable of implementing the mechanism of local activation of natural hazards resulting in damaging an adversary's military, military-political, and military-economic assets, armed forces groups, and ecosystems as well as limiting its military or economic activity.[53]

Geophysical processes are influenced most by nuclear explosions, exposure to chemical compounds, and electromagnetic emissions. International legal acts have limited nuclear issues but the initiation of violent acts of nature (earthquakes, tsunamis, etc.) using trigger mechanisms (energy amplification factors) is now an issue. Trigger mechanisms could, for example, influence geophysical stress points, such as the junction of tectonic plate movements where a significant amount of energy is accumulating. The fast release of this energy could result in earthquakes or a tsunami. Earthquakes can be initiated directly through a naturally occurring electromagnetic or mechanical impulse, citing a Russian work on ground-space monitoring and predictions (this was their only mention of electromagnetic emissions). Chemical compounds could be used to induce precipitation and thereby delay or restrict troop movements or aircraft and reconnaissance equipment employment. Other chemical compound uses under consideration were aerosols, smoke, and other active chemical compounds to affect combat actions,[54] which are not at all "new."

Modeling Operations

Russia has developed a modeling complex that supports "decision-making for an operation (battle) at four levels of command and control: center, grouping of forces on a strategic axis, army, division (brigade), and makes it possible to reduce decision-making by 3-5 times."[55] The modeling complex supports the following issues:

- Forecasting the results of the course and outcome of combat operations with respect to basic parameters (one's own losses and enemy losses, depth of offensive penetration, tempos of advance) for the given period of preemption
- Visualizing changes in the situation on an electronic map
- Automatically determining the type of operation with respect to the situation, displayed on an electronic map
- Distributing allocated ammunition reserves to elements of the order of battle according to operational days and zones of operation of the first-echelon formations for each day
- Modeling individual tactical tasks and episodes
- Taking into consideration the principal effects factors: terrain trafficability, weather conditions, degree of engineer preparation of the area of combat operations and its changes during combat operations.

There is the possibility of changes in the situation on account of the following:

- A change in the make-up of the formations with respect to areas of responsibility
- A change in the width of the areas of responsibility

- Entry of second echelons, air assaults, and naval assaults into battle
- Delivery of air and naval strikes
- A change of the engineer outfitting of the terrain by means of remote mining; establishment of obstacle centers (zones)
- Deployment of mobile demolition detachment and antitank reserve lines on dangerous axes
- Deployment of fire lines of tank and antitank formations
- Simultaneous calculations of several independent axes on a single electronic map
- Comparison of plan alternatives and arranging them according to preference.

In addition, models that support the work of other officials during the development of a plan, preparation of a decision, and command and control of battle during its conduct, include the following:

- A system for monitoring troop combat capability
- A system for automated terrain assessment
- A model for assessing the effectiveness of the functioning of the air defense system
- A software set for command and control of fire destruction during combat.[56]

Implications for MDO

There are several implications that US leaders should take into consideration after this study of Russian PMA. Some of course are more significant than others.

First, an important implication is that, since **Russia does not stereotype its operations**, there will be no "set play" against which to act. A common habit in the West is to announce types of operations, such as air-land battle or multi-domain operations. Russia makes no such announcements. All that remains is for Western analysts to conceptualize how the elements of Russian thought might be applied against an opponent's more stereotyped operation. Holistically this conceptualization must include recent considerations of Russian advancements in military art, which would include new weaponry, recent combat experiences, and theoretical announcements about topics such as fire or maneuver.

Second, as the discussion above indicated, the implication is that recent **Russian modeling of operations most likely includes MDO** and other military employments. Modeling works to forecast events, takes into consideration any changes in contemporary situations, and assesses capabilities. Such modeling allows decision-makers to better confront adversary plans to Russia's advantage. For example, Zapad-2017 was an exercise that allowed Russia to quickly assess US MDO planning. The movement of Russian forces to the vicinity of its Western border caused the US and NATO members to respond with their own force deployment. Russia's leadership was able to visualize at one quick glance just where MDO forces might be arrayed against Russia in the event of a future conflict in the region. Further, Russia's war games center at the General Staff Academy was refurbished a few years ago and, along with the 27th Central Scientific Research Institute, which is also involved in computer war games, a considerable computer wargaming ability has been developed. As long ago as 2014 an article in *Military Thought* noted that "measures have been taken concerning the methodology of modelling deep, distance, non-contact strike means aimed at groups and targets of the enemy."[57] Which leads to the next implication.

Third, for the Russian military, MDO's potential deployment in the Baltics could constitute, from the Kremlin's perspective, a direct threat to the homeland, as it would be located just hours away. However, multi-domain task forces are still based at US locations, so this is not the case at the present time. In the interim, a calibrated force posture has been established in theater, ready to deter but act in the event of a Russian advance. Russia might be compelled, if an MDO deployment happens, to guarantee its **"equal security,"** an old concept that still resounds in the halls of strategic thought in Russia. The essence of the concept is that if MDO threatens Russia then Russia must threaten the US homeland, thereby making both sides feel equally threatened. The concept has been implied for potential action for a few years now. For example, in a May 2015 article at the Russian news website Svobodnaya Pressa, two influential Russian thinkers, Aleksandr Perendzhiyev, from the Association of Independent Military Political Experts, and Colonel-General

IF MDO THREATENS RUSSIA THEN RUSSIA MUST THREATEN THE US HOMELAND, THEREBY MAKING BOTH SIDES FEEL EQUALLY THREATENED.

Leonid Ivashov, a member of the Academy of Geopolitical Problems, advocated a direct threat to the US homeland with nonnuclear deterrents.[58] These men advised Russian leaders to utilize deterrence and collective security strategies as counters to US moves in Europe. The article suggested placing a task force off the coasts of the US, so that it would have American territory in its sights. The deterrent factor, it was noted, must be moved up to the border of the US.[59] That clearly implies the potential for a task force stationed in Cuba. In 1962 it was possible to find Russian missiles in Cuba and, through the Cuban Missile Crises, get them off the island. If Russia creates a task force in Cuba with a nonnuclear deterrent such as unmanned aerial vehicles (UAVs) that are armed or cruise missiles, it will be incredibly hard to find them. They could be hidden in buildings or hangars, and this could strongly affect US responses to such potential actions.

Such a threat against the US could be augmented with the use of deep operations initiated from Russia. Russia's global reach capability includes weaponry such as hypersonic missiles, cyber issues, lasers in space, and so on, all capabilities that Putin is trumpeting. For this reason, Russia's development of strategic axes in space along with space theaters of military operations need to be taken as serious indications of the development of Russian "strategic operations for the destruction of critical infrastructure targets (SODCIT)," which the Kremlin professes to have. US targets most likely have been determined, whether they be political, economic, or military. Of course, the US also has similar capabilities to threaten Russia.

Fourth, what would be the **implications of a two-front conflict** involving Russia in the West and China in the East for the US, NATO, and their Asia-Pacific allies? Can MDO be spread that widely as the concept's leaders currently profess? One Russian theorist has already noted that in conjunction with China, Russia has developed asymmetric responses to the US's network centric capabilities. They include creating forces, systems, and means that, for example, cause fire and electronic damage to the elements of the information grid (command posts, communications centers, orbital grouping of reconnaissance and control satellites, etc.).[60] There has been much written about Russian and Chinese collusion to support such an implication. Further, how seriously is Russia considering the use of Chinese stratagems in its cyber operations? As the Tatarinov article above indicated, it is at least considering the possibility of using cyber stratagems.

Fifth, some of the far-reaching consequences of specific aspects of Russian military art mentioned above hold serious implications for MDO. Of first concern is the disorganization concept, which is designed to seriously disrupt an opponent's information, robotics, and command and control mechanisms whether in an MDO setting or in the continental US. The resulting consequence for MDO would be an inability to integrate operations and chaos regarding attempts to coordinate planning. Maneuver would be seriously affected as well. A side effect implication for MDO is that the development of modular designed forces may work better against an adversary focusing on the use of the disorganization concept than against those based on interdependence.[61] As demonstrated above, Russia continues to write on the disorganization concept. The most recent example is a 2020 article in *Military Thought* devoted to training radio-electronic operators with the necessary skills to disorganize robotic complexes in foreign armies. The article

noted that operators must be familiar with foreign army control systems, their vulnerable links, and the best radio-jamming targets to make decisions on the employment of such units.[62]

Sixth, the **recent additional Russian focus on asymmetric and indirect operations**[63] must be considered as thoughts on how to counter MDO and thus as new implications, since they have grown in relevance compared with traditional military options. For example, Russia's *Journal of the Academy of Military Science* published an article in 2019 titled "Social Media as a Theater of Information War in Today's Hybrid War." The implication is clear that the US is using social media as a new theater of war that Russia must counter, and Russia considers the US as the main proponent of hybrid war. The implication is that MDO will face numerous attempts to cajole the population via social and other media forms and cause havoc and chaos. Russian analysts note that military conflicts and armed struggles are distinguished by national affiliation, religious practices, degree of legitimacy, attitude toward international laws, and other factors,[64] and each point may serve as a vector of attack against MDO forces. For Russia, all forms of armed struggle are in play and they reflect changes in military art that go beyond the battlefield and extend into politics and economics.

Russia now has an adequate quantity of new weapons, some of which are asymmetric, and plans to employ them under various conditions. Asymmetric actions and weaponry developments are conducted to eliminate advantages that an adversary enjoys. A 2017 article, "For What Kind of Warfare Should the Russian Armed Forces Be Prepared?" noted that there are four areas where asymmetric operations should focus attention: keeping secret preparations for and the conduct of combat actions (i.e., no stereotyping); searching for and discovering an adversary's weak points; concentrating efforts on vulnerable spots (facilities) of an adversary; and imposing one's version of conflict and how it unfolds on an adversary.[65]

Seventh, the military's recent construction of the ERA Technopolis in Anapa on the Black Sea is an excellent indicator of the scientific endeavors that are the most important capabilities for President Putin and Defense Minister Shoygu to develop. These **priorities may have been the result of an investigation of MDO's capabilities.** In February 2019 it was noted that eighteen laboratories and eight scientific-technical fields were organized at the Technopolis. The latter fields included the following:

1. Robotics
2. Information Security
3. Information-Telecommunication Systems
4. Power Supply Technologies, Equipment, and Life-Support Machines
5. Artificial Vision and Pattern Recognition
6. Informatics and Computer Equipment
7. Biotechnical Systems and Technologies
8. Nanotechnologies and Nanomaterials.[66]

Artificial intelligence (AI) information security technology, supercomputers, and robots are also under development at Anapa.[67] AI will be applied to reconnaissance systems and precision weaponry, and the development of microelectronics for AI along with the development of digital and microwave technology and artificial neural network technologies will be established in defense and security areas.[68] Also of importance is that quantum computer developments are being studied at Anapa, which can assist in the

design of new weapons (asymmetric ones?) and allow for hacking an opponent's military and infrastructure encryption systems. For Russia this is "an overarching strategic task for preserving national sovereignty and defense sufficiency."[69] AI, quantum, and other such advancements (nanotechnologies, etc.) all are considered to be indirect ways to defeat an opponent without firing a shot.

Naturally, the nature of armed struggles on the battlefield will be influenced as well by the development of directed energy weaponry and other weapons based on new physical principles that will result in sharp changes in all parameters of warfare.[70] The characteristic features of armed struggles at the beginning of the 21st century on the battlefield, according to one source, include the following features that offer indirect and asymmetric avenues of approach:

- An extensive spatial scope
- The mass employment of precision weapons and radio-electronic resources
- New forms and methods
- Military operations in all spheres
- Struggles to attain the strategic initiative and superiority in command and control
- Destruction of important objectives and infrastructure by fire to an opponent's entire depth
- Extensive maneuver of forces of all types
- A constant threat of widening the operations scale.[71]

The many aspects of military conflicts under consideration in Russia are demonstrated with the diagram in Appendix Three that was taken from a Russian military analysis.

Conclusions

When Western analysts of Russian military affairs are asked "what is military art?" they usually reply that it is the use of strategy, operational art, and tactics. This is true but, as the discussion above has demonstrated, it is not only much more but is also continually adaptable to changes. Military art includes the employment of knowledge refined from combat experiences and technological advances in equipment and weaponry. It is the creative employment of knowledge applied against specific conditions or the development of decisions to fit situations at hand. Some decisions are unconventional and unique, while others may be based more decisively on older principles of military art or combat experience used in a new fashion. The focal point of Russia's military art is recommendations for action based on a commander's creative ability and knowledge accumulated over time. These recommendations are apt to change regularly along with the development of new capabilities or ways to use them. Military art cannot be stereotyped. Of equal importance is whether military art will add "planetary" or "global" to its context of strategy, operational art, and tactics. As has been noted before, technology determines strategy today with its reach and speed. Likewise, technology enables global operations. It will be of interest to follow this discussion as it evolves.

Various and unexpected ways that Russian forces can impact the forms and methods of conflict were developed. Military art can be used to disorganize an opponent's command and control systems, create strategic aerospace axes for deep operations and attacks on a planetary scale (to ensure equal security), develop military stratagems and geophysical weaponry, and apply new forms of maneuver and electronic warfare among other issues. In this latter list, disorganization and REB forms seem to go together in regard to the conduct of combat as do deep operations and the initial period of war. Maneuver and fires are components of both, while indirect operations and geophysical weapons are more asymmetric in design. All of the information in both lists offers areas of consideration to watch.

SOME DECISIONS ARE UNCONVENTIONAL AND UNIQUE, WHILE OTHERS MAY BE BASED MORE DECISIVELY ON OLDER PRINCIPLES OF MILITARY ART OR COMBAT EXPERIENCE USED IN A NEW FASHION.

What the discussion indicates is that Russian theorists are thinkers who incorporate historical lessons learned, national priorities, and new capabilities to advance their knowledge base about conflict and new ways to apply force. This, naturally, has implications for MDO developments, as developed above. US commanders and analysts should, based on the analysis above, take the following implications more seriously than the others:

- A major implication for MDO is that it must procure jam-proof command and control systems and other such electronic warfare offset equipment if it hopes to avoid Russian disorganization efforts.
- AI will continue to be integrated into robotics and other equipment. Military AI ensures that conflicts will be lethal, sudden, and unpredictable, depending on the state of development of AI

in various nations. For example, in Russia the Bylina EW system will reportedly be controlled by AI by 2025 and will be able to find, analyze, and classify targets in real time with instant calculations and then determine the best means to suppress them. Targets include communication systems, radars, and satellites.[72] Other weaponry, such as so-called kamikaze drones that can independently attack targets, are under development in Russia and elsewhere.

- Strategically, there are three major implications to keep in mind. First, the US should keep a close eye on Russian operations in Cuba (ports, airfields, etc.) for the introduction of UAVs, cruise missiles, and other equipment so that Russia can guarantee its equal security. Second the speed of contemporary operations indicates that there must be a laser focus for US planners to protect infrastructure, since operational speed can imply that an intervention (using cyber, etc.) could be over before an opponent recognizes it has begun. Reconnaissance efforts against critical infrastructure designed to insert malicious viruses or spot weak links must be thwarted, as access to information capabilities offers preemption opportunities. Finally, it must be remembered that technology no longer determines tactics—it now determines strategy due to its extended reach and capabilities. Russia is organizing operations in space to assist in this effort. Battlefields can now be controlled from anywhere on the globe by several adversaries, which may result in the development of a global aspect for military art, changing the triad to a quadrilateral.

Appendix One: Evolutions in the Correlation of Strategy, Operational Art, and Tactics

Two authors, nearly 50 years apart, wrote on evolutions in military art's components of strategy, operational art, and tactics. Their reports are summarized here in order to demonstrate how objective and subjective factors exert change on the evolution of military art, and why military art's principles change and are not locked in stone.

Writing in *Military Thought* in 1971, author I. Zav'yalov, a gold star recipient upon his graduation from the Academy of the General Staff, wrote on the evolution in the correlation of strategy, operational art, and tactics. He noted the following about the practical significance of a correct understanding of this correlation:

> It enables command cadres to evaluate more deeply and to see more clearly the role of each element of the complex military organism, each unit, formation, and field force in the multifaceted process of military operations, in the execution of their assigned combat missions, and in the achievement of the general aims of war, to make purposeful and expedient decisions on the engagement or operation, and to plan the combat utilization of manpower and hardware with greater confidence.[73]

As an example of the correlation's importance, he noted that in WWII the introduction of intensified motorization and mechanization increased troop tactical mobility and maneuverability. This increased rates of advance, depth of offensive operations, reduction in length of operations, and the achievement of stated objectives.[74] The interrelationship among these three components works in a downward direction expressed with methods of warfare, strategic objectives, and actions determined by the political aims of a war and the combat capabilities of the armed forces. The interrelationship moves in an upward direction along the line of executing combat missions and achieving stated objectives.[75]

In the past the combination of fire and movement became the foundation of tactics. The appearance of nuclear weapons disrupted this concept, since there was a huge increase in a weapon's potential to inflict casualties or death, while tactical protection means from the weapon hardly changed. Yet this is how it is—a new weapon can negate old methods and cause new ones to develop as well. This can cause changes in military art; that is, new tactics, operational art, and strategy are developed. Nuclear weapons changed the traditional stepped interrelationship between strategy, operational art, and tactics, giving them greater independence. New nonnuclear weapons do the same, making military art more complex due to one side's increased combat potential and scope of combat operations.[76]

Decisions still consist of a leader assessing objective conditions and then using ability and skill (subjective factors) to influence the situation to their advantage. This could include an assessment of the following: the correlation of forces, the character of hostile activities, and the combat capabilities of manpower and weapons of the strategic and operational echelons of both sides. In so doing, the strategic echelon influences decision-making at the operational echelon, and the latter plays a similar role with respect to the tactical echelon. The correlation among these levels depends on the specific conditions of a given war and thus is not a constant.[77]

Years later, the initial words of a 2019 article in the *Journal of the Academy of Military Science* echoed these thoughts. In an article titled "The Interrelation Among Military Strategy, Operational Art, and Tactics in Modern Conditions," author A. Korabel'nikov noted that military art had changed under the influence of objective and subjective factors, among which are the development of means and technologies of armed conflict, the make-up and conditions of the opposing side's troops, opinions of a potential enemy on the methods of starting and conducting military operations, the experience of military conflicts, the content of the military doctrine of states, and so on.[78]

The principal content of military strategy was stated as follows:

- The implementation of a set of measures to safeguard state security and public safety
- The ability to reliably guard and protect the state border
- The requirement to eliminate emergency situations of a natural and technogenic nature
- The systematic development of forms and methods of strategic deterrence aimed at preempting or reducing destructive actions on the part of an aggressor-state (coalition of states).[79]

The principal content of operational art was noted to be:

- A set of measures for strategic deterrence (nuclear and nonnuclear), prevention of military conflicts, information operations, and operations in the information-communications domain
- Protection of the state border by ground units
- Conduct of operations (combat) in armed conflicts and in actions to maintain (regenerate) international peace and security.[80]

Tactics included the following:

- The theory and practice of maintaining the combat and mobilization readiness of formations, military units, and subunits at a level that guarantees their joint execution of combat tasks in the form of service-combat and operational-service activities
- Employing weapons, military and special equipment, and special resources in the sphere of public safety and state security in peacetime
- Preparing for and conducting tactical operations as part of interservice and interdepartmental groupings under conditions of using all types of means of destruction to prevent and interdict acts of aggression.[81]

Korabel'nikov stated that there is a close relationship among the three components of military art. He also stated that the tasks presented below in relation to tactics "are in agreement with the tasks of military strategy" and "tactical tasks contribute to the execution of operational art tasks."[82] Those tactical tasks are:

- Studying the laws and principles of tactics
- Developing measures to support a high level of combat and mobilization readiness
- Developing the essence of concepts of operations (tactical operations, combat)
- Developing the content of tactical tasks to be carried out by formation and military units when executing assigned tasks
- Developing methods of carrying out tactical tasks
- Maintaining the combat and mobilization readiness of formations, military units, and subunits
- Studying and generalizing combat experience

- Improving methods of combat training for formations, military units, and subunits
- Adopting verified decisions and preparing combat operations
- Exercising command and control of military units and subunits during the execution of assigned tasks.[83]

Korabel'nikov then stated that the "realization of an all-purpose military strategy and operational art is possible through the timely identification of trends in the development of tactics."[84] Principal trends were identified as follows:

- Increases in the spatial scope of armed struggle at the tactical level
- The dynamic use of the surface layer of the air domain (which included the use of UAVs for air reconnaissance, enemy reserve identification, reconnaissance of earlier detected targets, corrected artillery fire, target indication, and verifying results of strikes)
- The increased role of fire destruction of an enemy and augmenting its power with maneuver directly on the battlefield
- The increased role of information superiority
- The important role of tactical camouflage
- The continued increase in the decisiveness of combat goals (most important is the disorganization of enemy efforts with the use of the latest weapons, gaining the initiative, and quickly destroying the enemy)
- The increasing dependency of success on the reliable resolution of issues of all-around troop support (reconnaissance, radio-electronic warfare, tactical camouflage, moral-psychological, rear, and technical support)
- The increasing role of the quality of command and control.[85]

Tasks "interconnected with military strategy and operational art that stand before tactics" included the following:

- Refining the structure and content of tactics as a field of military art
- Developing the essence of the concept of combat and its content
- Developing the content of tactical tasks carried out by formations, military units, and subunits in various types of combat operations
- Developing methods for formations, military units, and subunits to carry out tactical tasks under various situational conditions
- Improving issues of all-around support of formations, military units, and subunits under various situational conditions
- Refining the structure and content of legal documents
- Introducing theoretical issues into the practice of troop training
- Developing a set of measures for the preparation for battle and their gradual introduction into educational activities, with subsequent military testing
- Improving the organization of the work of commanders and staffs while carrying out assigned tasks and introducing this into educational activities and troop training
- Directing the scientific, creative, and research activities of pedagogical workers toward developing issues of tactical theory and introducing this into educational activities

- Creatively employing the experience of the combat operations of formations, military units, and subunits in educational activities, considering the issues being worked out in exercises and the experience of students
- Improving the forms and methods of training and creatively employing them in educational activities.[86]
- Trends and tasks and other issues were thus very different when Korabel'nikov wrote than when Zav'yalov did 50 years prior. Objective and subjective conditions change, and this causes change in PMA.

Appendix Two: Examples of Dissecting, Severance, and Encirclement Operational Maneuvers

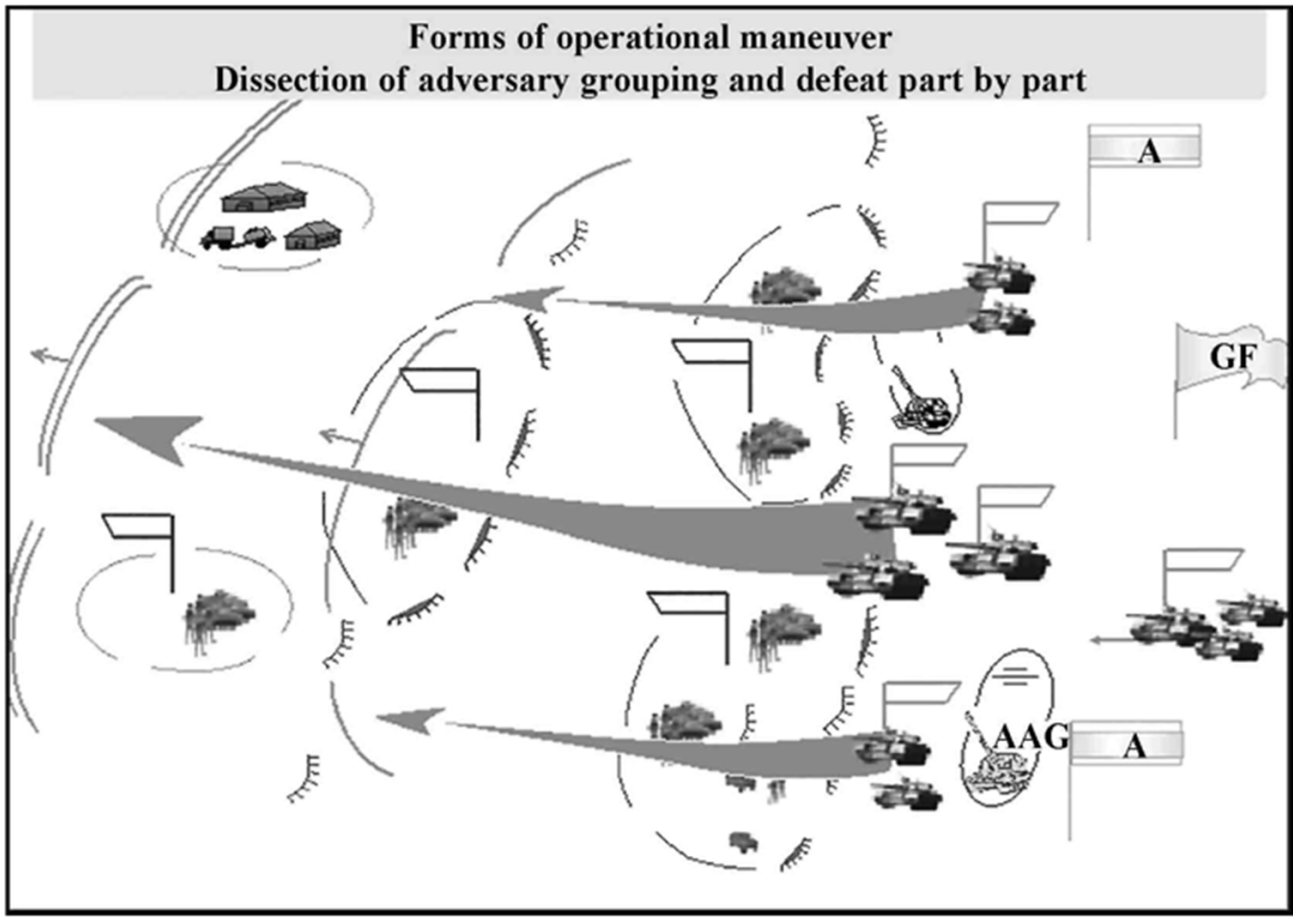

FIGURE 2. THREE DISSECTING ATTACKS BY THE ARMY WITH THE SUBSEQUENT DEFEAT OF AN ADVERSARY TROOP GROUPING PART BY PART.[87]

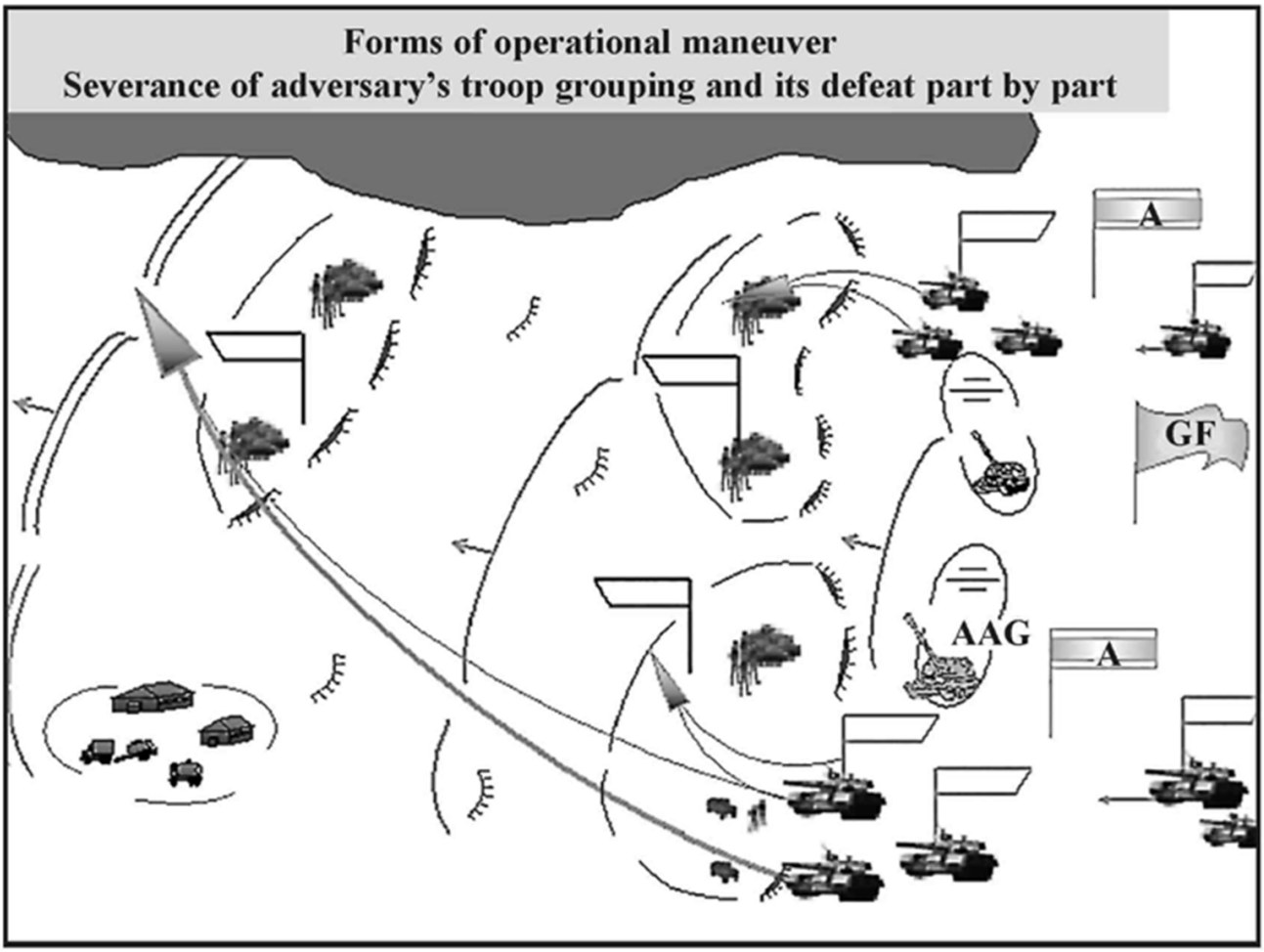

FIGURE 3. SEVERANCE OF A PORTION OF AN ADVERSARY GROUPING TO ISOLATE IT FROM MAIN FORCES AND TO PRESS IT AGAINST A MAJOR WATER OBSTACLE.[88]

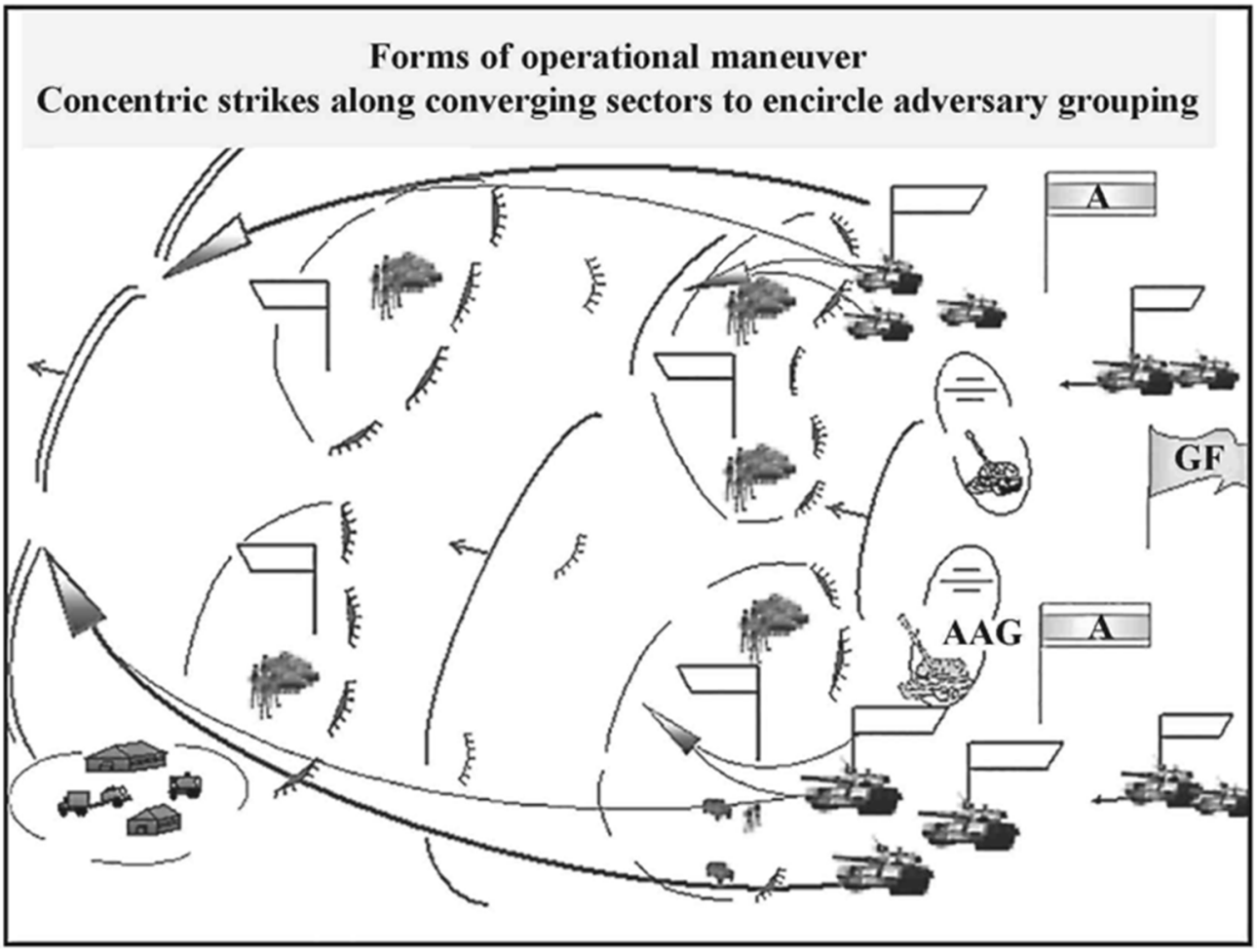

FIGURE 4. ENCIRCLEMENT OF AN ADVERSARY TROOP GROUPING.[89]

Appendix Three: A Classification of Military Conflicts

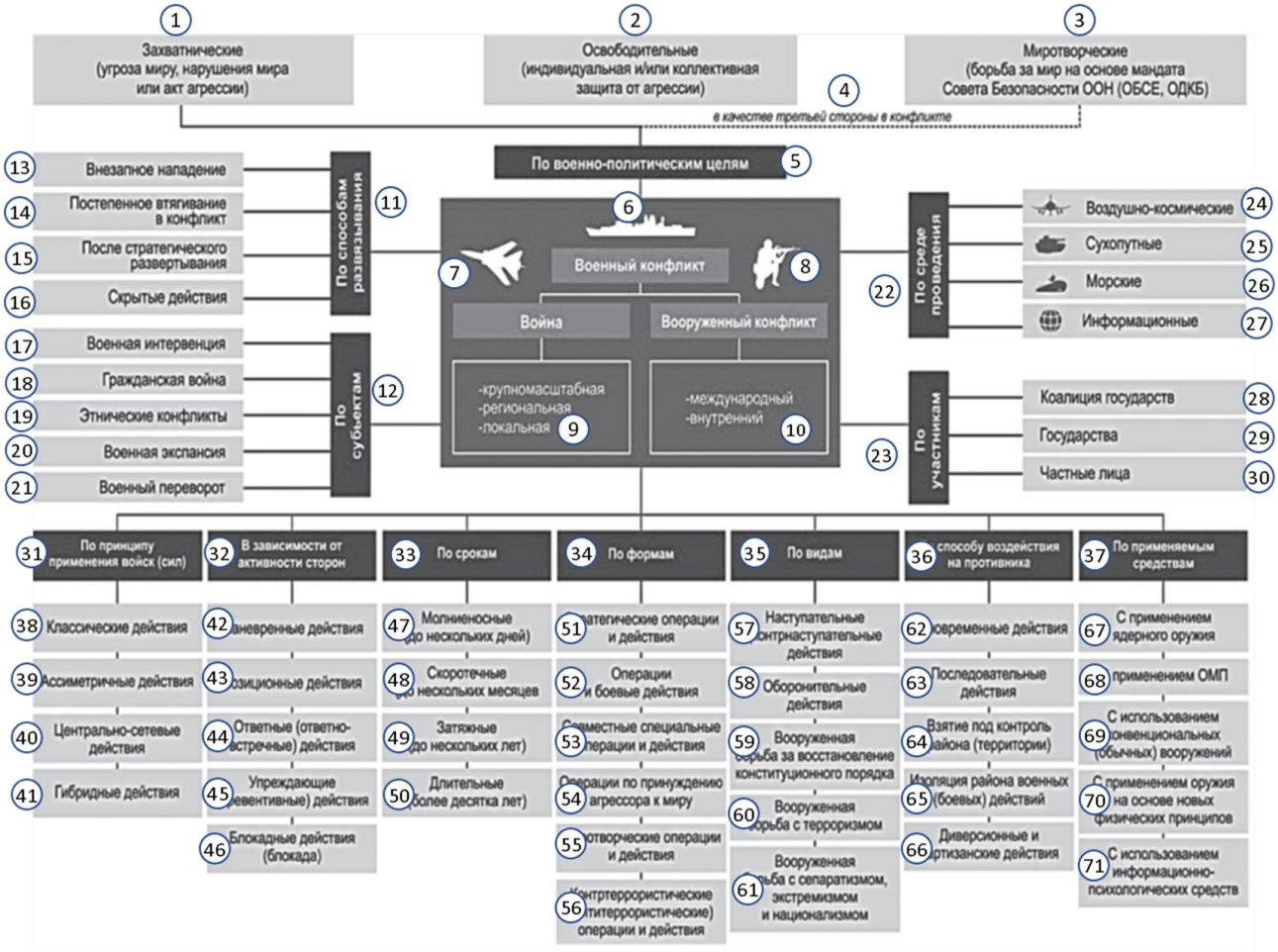

Рис. 2. Основы отечественной классификации современных военных конфликтов

FIGURE 5. OUTLINE OF THE "BASIS OF DOMESTIC [RUSSIAN FEDERATION] CLASSIFICATION OF CONTEMPORARY MILITARY CONFLICTS"

(RUSSIAN VERSION IS FOLLOWED BY THE ENGLISH TRANSLATION OF EACH NUMBER ON THE FOLLOWING PAGE).

FIGURE 5 KEY
(BASIS OF DOMESTIC [RF] CLASSIFICATION OF CONTEMPORARY MILITARY CONFLICTS)

1. Aggressive (threat to peace, violation of peace, act of aggression)
2. Liberation (individual and/or collective defense against aggression)
3. Peacekeeping (struggle for peace on the basis of a mandate from the UN Security Council, OSCE, CTSO)
4. As a third side in a conflict
5. With respect to military-political goals
6. Military conflict
7. War
8. Armed conflict
9. Large scale; regional; local
10. International; internal
11. With respect to method of unleashing
12. With respect to subjects
13. Surprise attack
14. Gradual involvement in conflict
15. After strategic deployment
16. Covert operations
17. Military intervention
18. Civil war
19. Ethnic conflicts
20. Military expansion
21. Military coup
22. With respect to medium of conduct
23. With respect to participants
24. Aerospace
25. Ground
26. Naval
27. Information
28. Coalition
29. States
30. Private persons
31. With respect to principle of employment of forces
32. Dependent on dynamism of the sides
33. With respect to duration
34. With respect to forms
35. With respect to types
36. With respect to method of pressure on the enemy
37. With respect to the resources employed
38. Classical operations
39. Asymmetric operations
40. Network-centric operations
41. Hybrid operations
42. Maneuver operations
43. Positional operations
44. Retaliatory (retaliatory-meeting) operations
45. Preemptive (preventative) operations
46. Blockade operations
47. Blitzkrieg (up to several days)
48. Fast-moving (up to several months)
49. Protracted (up to several years)
50. Long (more than ten years)
51. Strategic operations and actions
52. Operations and combat operations
53. Joint special operations and actions
54. Operations to force peace on the aggressor
55. Peacekeeping operations and actions
56. Counterterrorist (antiterrorist) operations and actions
57. Offensive (counteroffensive) operations
58. Defensive operations
59. Armed struggle to reestablish constitutional order
60. Armed struggle against terrorism
61. Armed struggle against separatism, extremism, and nationalism
62. Simultaneous operations
63. Successive operations
64. Taking a region (territory) under control
65. Isolation of a region of military (combat) operations
66. Sabotage and partisan operations
67. With the employment of nuclear weapons
68. With the employment of weapons of mass destruction
69. With the use of conventional weapons
70. With the employment of weapons based on new physical principles
71. With the use of information and psychological resources

Appendix Four: A Few Definitions Associated with Military Art and Military Thought Articles on Disorganization (2016-2020)

military art (военное искусство)–the theory and practice of preparing for and conducting armed struggle on land, at sea, and in near-earth space. Military art encompasses the principles of the organization, conduct, and all-around support of all contemporary operations and combat and the organization of the command and control of these activities.[91]

military art (военное искусство)–the theory and practice of preparing for and conducting military operations. It consists of strategy, operational art, and tactics, which are closely interconnected and interdependent.[92]

theory of military art (теория военного искусства)–one of the main components of military science, it studies and understands the nature, regularities, principles, forms, and methods of preparing for and conducting all ranges of armed struggle. In its research and at a new stage this theory will be based on objective laws and use the tenets and conclusions obtained by other branches of military science that take part in studying the problems of military affairs. In the near term, the structure of this theory will remain unchanged: strategy, operational art, and tactics.[93]

theory of military art (теория военного искусства)–the theory that studies and understands the nature of wars and armed conflicts, their regularities and principles of conduct, and issues of developing and preparing armed forces and the country for defense.[94]

principles of military art (принципы военного искусства)–the guiding tenets, rules, and most important recommendations regarding the organization and conduct of military operations.[95]

THE DISORGANIZATION CONCEPT IN MILITARY THOUGHT, 2016-2020	
2016	"Methodical Approach to Assessing the Influence of Disorganization of Operational Reserves' Control to the Rate of the Enemy's Advance," Stuchinsky (Issue 11)
2017	"Trends in Increasing the Effectiveness of the Organization of the Combat Employment of Radio-Electronic Warfare Troops in the Operations of Ground Forces Formations," Nikitin (Issue 5) "On the Issue of Complex Defeat of the Enemy and the Ways of Its Implementation During Control Disorganization," Pasichnik (Issue 6) "On the Disorganization of Control over Troops (Forces) and Weapons," Donskov, Moraresku, Panasyuk (Issue 8) "On the Main Provisions of the Theory of the Disorganization of Command and Control of Troops (Forces)," Klyushin, Ksholuyenko, Anokhin (Issue 9) "Combat Employment of Radio-Electronic Warfare Troops as a Basic Component of Ground Forces Operational Art," Lastochkin, Koziratsky, Donskov, Mororescu (Issue 9) "Determining the Ways to Disorganize the Control of Enemy Troops and Weapons," Kaminsky (Issue 11)
2018	"Achieving Superiority in Command and Control as a Goal for the Use of Radio-Electronic Warfare Forces in Ground Force Operations," Donskov, Morarescu, Besidin (Issue 1)
2019	"Estimating the Combat Efficiency of Army Formations Adjusted by the Effect of Control Disorganization," Anokhin, Vystorobsky, Kholuenko, Gromyko (Issue 12)
2020	"The Model of Organizing Professional Military Training of Experts in Electronic Warfare for Disorganizing Systems of Robot Control in Foreign Armies," Golubev, Kiryanov, Zhirnov (Issue 2)

Appendix Five: Definitions of Russian Military Art and Its Principles; Experts Discuss Changes in Military Art

Definitions of Russian Military Art

Much has been written over the years in the Soviet Union and Russia about military art. The term has been the topic of numerous articles in journals as well as entire books. Several definitions of military art since 1965 begin the discussion. They provide a perspective on the topic over time and the subtle changes that have occurred in its essence. That is followed by three definitions of the theory of military art, one each from 2004, 2013, and 2015.

Russia's 1965 *Dictionary of Basic Military Terms* defined **military art** (voennoe iskusstvo) as follows:

> The theory and practice of engaging in combat, operations, and armed conflict, with the use of all the resources of the service branches and services of the armed forces, and also support of combat activities in every regard. Military art, as a scientific theory, is the main field of military science, and includes tactics, operational art, and strategy, which constitute an organic unity and are interdependent.[96]

In 1999, military art was defined, in a broad sense, as the theory and practice of preparing for and conducting military operations on land, at sea, and in the air; in a narrow sense, it is the activities of personnel (individual officials) and actions of military formations that have the highest degree of perfection and that are characterized as skillful, unconventional, unique, etc.[97] General of the Army Makhmut Gareyev, President of the Academy of Military Science for over 20 years and a professional voice in Russian military affairs, defined military art in 2013 as follows:

> Military art is the sphere of practical activity, the ability to employ knowledge while taking into account the specific conditions of the situation where, besides knowledge, developed theoretical thinking and high organizational and volitional qualities are also needed, which are capable of ensuring the implementation of the decisions that have been made and achieve victory.[98]

Other Russian military experts offered varying opinions on the concept. I. N. Vorobyov and V. A. Kiselev noted in 2014 that the "evolution of military art is the chain of a continuous quest to perceive the nature of war, to establish rules to prepare and conduct war (where it is critical to avoid miscalculations), and to rout the enemy."[99]

In 2015 Chekinov and Bogdanov offered two definitions of military art. The first definition was in an article on problems and opinions about military art in the 21st century:

> Military art is a sphere of theoretical and practical activity that involves the ability to creatively employ knowledge, taking into consideration the specific conditions of a situation when preparing for and conducting military operations (combat), where, in addition to knowledge, developed creative thinking and high organizational and strong character qualities are necessary for the commander. Taking into consideration specific changes in the content of interstate confrontation when achieving the political and military-strategic goals of wars and armed conflicts, in our opinion the following theories comprise the structure of military art: the theory of military art with the interacting theories

> of nonmilitary measures and "indirect" actions and related sciences and disciplines; the theory of all-round support of the Armed Forces; and the theories of the military art of services and branches of the Armed Forces.[100]

Chekinov and Bogdanov's second definition of military art appeared in an article the same year in an article devoted to systemology:

> Military art is the theory and practice of preparing for and conducting military operations on land, at sea, and in near-earth space, encompassing the principles of the organization, conduct, and all-round support of combat operations and the command and control of these actions, and influencing the forms of employment of the armed forces and methods of their conduct of military operations, as well as using "nonmilitary" measures and "indirect" actions and other forms of struggle.[101]

As differentiated from military art, in an article he penned alone, Bogdanov defined the theory of military art (teoriya voennogo iskusstva) in 2004 as one of the main components of military science. It studies and understands the nature, regularities, principles, forms, and methods of preparing for and conducting all ranges of armed struggle. In its research and at a new stage this theory will be based on objective laws and will use the tenets and conclusions obtained by other branches of military science that take part in studying the problems of military affairs. In the near term, the structure of this theory will remain unchanged: strategy, operational art, and tactics.[102]

Gareyev stated that the theory of military art is the nucleus of military science. The theory studies the laws, nature, principles, and methods of the conduct of armed combat and consequently includes the theory of strategy, operational art, and tactics.[103]

Chekinov and Bogdanov offered another definition of the theory of military art in 2015, stating that it was "the theory that studies and understands the nature of wars and armed conflicts, their regularities and principles of conduct, and issues of developing and preparing armed forces and the country for defense."[104]

In 2018 A. A. Korabel'nikov, writing in the *Journal of the Academy of Military Science,* stated that today, there is a hierarchy of factors affecting military art. The concept has not only broadened but structurally changed. He noted that these factors (with factor defined as a moving force, a reason for some process) are now the political, social, economic, scientific-technical, demographic, historical, subjective, military, and other issues. While the political factor retains its priority, all remaining factors should now be thoroughly considered in the military factor. He added that methods of conducting military operations is defined as "a selected combination, sequence, and procedures for employing forces and means" where the primary factors to consider are the "nature of enemy operations, the condition of one's own troops, and the means of armed struggle to be employed."[105]

To summarize, when most analysts are asked "what is military art?" they reply that it is the use of strategy, operational art, and tactics. This is true but, as the definitions of professional Russian officers above note, military art has other characteristics, including the ability to employ knowledge while taking into account the specific conditions of the situation; actions characterized as skillful, unconventional, unique, etc.;

the chain of a continuous quest to perceive the nature of war, to establish rules to prepare and conduct war; the theory and practice of preparing for and conducting military operations on land, at sea, and in near-earth space; and, in addition to knowledge, military art is developed creative thinking that requires high organizational and strong character qualities. In 2004, Bogdanov noted that "in the new term, this theory will remain unchanged: strategy, operational art, and tactics." It would be interesting to know if he feels the same way today, 16 years later.

The theory of military art, the analysts noted, studies and understands the nature, regularities, principles, forms, and methods of preparing for and conducting all ranges of armed struggle; studies the laws, nature, principles, and methods of the conduct of armed combat and, consequently, includes the theory of strategy, operational art, and tactics; and studies and understands the nature of wars and armed conflicts, their regularities and principles of conduct, and issues of developing and preparing armed forces and the country for defense.

On Russia's Principles of Military Art and Stereotyping

The PMA offer recommendations for action based on generalizations in combat experience over the years. It is here where such knowledge is integrated with the creativity of commanders to produce skillful, unconventional, and unique actions designated as military art. Principles are not eternal but change in accordance with military technology and a commander's knowledge and innovation. Therefore, based on the changes in weapon capabilities today, the principles should be expected to change today as well as into the future.

Russia's 1965 *Dictionary of Basic Military Terms* defined the PMA as follows:

> The fundamental propositions which follow from the objective laws of war, and which determine trends in the preparation for, and conduct of, armed conflict, corresponding to given historical conditions. In contrast to the objective laws, the principles give recommendations for action. Use of the principles of military art by commanders and staffs at all levels, taking the actual situation into account, gives the highest possible assurance of successful attainment of the goals of the armed conflict operations, or battle. Soviet military science considers that principles of military art are a concentrated scientific generalization of combat experience. Soviet military science denies the existence of eternal, immutable principles of military art. Such principles may be modified and perfected according to the specific military-political situation, the state of military technology, etc.[106]

In 1988 Harriet Fast and William F. Scott noted in their book *Soviet Military Doctrine* that Soviet PMA had not been permanently established. The 1965 definition seemed to confirm this finding, because PMA are general in nature and not eternal since principles may be modified. As a result, the Scotts attempted to summarize the PMA they had noted in Soviet writings from the 1960s through most of the 1980s:

- High combat readiness
- Surprise
- Activeness and the regaining of the initiative
- Coordinated employment and close interaction of forces
- Concentration of main efforts at the crucial moment.

The Scotts stated that more than one strategist noted the following:

- Decisiveness
- Complete use of all means and methods for achieving victory
- The simultaneous defeat of the enemy to the entire depth of its configuration
- Firm and continuous command
- The creation and prompt replacement of reserves
- Complete support for battle tasks, including material-technical support
- Correlation of the goals and missions in war according to the forces, means, and planned methods of military actions.

Finally, the Scotts stated that a single author noted the following:

- Economy of forces at the expense of secondary theaters of military action or operational direction
- Bold maneuvering and building up of forces
- Consideration and full employment of the moral-political factor
- Mobility and high rates of combat actions.[107]

In 2005 the journal *Military Thought* carried an article that examined several principles of military art, some of which are well known. They were:

- Readiness to resolve assigned tasks
- Concentration of efforts when resolving a specific task
- Surprise (uniqueness) of military operations for the enemy
- Setting tasks that form a goal and determine the level of resolution of each one
- The methods determine the suitable forms for resolving the tasks
- Centralization of command and control (unity of command)
- Allocation and economy of forces, means, time, and space
- Maintenance and regeneration of combat capability
- Freedom of maneuver.[108]

In 2006 Russian theorist N. M. Ilyichev wrote on the PMA and offered a shorter but similar way to understand the concept, noting:

> Thus, the principles of military art constitute the rules of actions for the military leader, which are generated on the basis of the profound and comprehensive knowledge of the laws of war and of armed struggle. They are historically oriented, i.e., they emerge at a definite stage of the evolution of military art, they are prone to changes, and some of them become inoperative.[109]

Again, changes in the PMA are understood to be inevitable. Further, Ilyichev noted that the PMA have a dual nature, where on the one hand they reflect the objective laws of war and armed struggle and, on the other hand, represent man's creative activity, the expression of subjective matter. This indicates that commanders have the freedom to create situations within the scope of objective reality. The PMA are rules for action worked out on the knowledge of the laws of war and represent "the guiding ideas and major recommendations concerning the methods and forms of troop warfare for winning victory over an opponent."[110] The PMA are aimed at pointing out how and with what resources, including a

commander's creativity, war may be conducted. The PMA are as necessary for military leaders as "notes for musicians" and are influenced by other conflict experiences.[111]

In 2008 I. N. Vorobyov and V. A. Kiselev wrote on the "Evolution of the Principles of Military Art." The principles they discussed reflected the fact that the evolution of military art "is the chain of a continuous quest to perceive the nature of war, to establish rules to prepare and conduct war, and that it was critical to avoid miscalculations and to rout the enemy."[112] Just as important was the observation that military art must be brought into line with the character of the new technical era.

The authors highlighted certain principles in bold in their article and they are presented here.

- The principle of the concentration of efforts in the main direction and at the decisive moment remains important. Such synergetic effects are composed of two interrelated components, fire and all-out attack, where fire plays the determining role.
- The principle of the dovetailed employment of heterogeneous and multiservice forces and assets in the operation and battle requires the maintenance of permanent coordination between them.
- The principle of suddenness has acquired multifarious forms and methods of application in modern operations. It is achieved with the employment of ingenious models of preparing and conducting operations, and a departure from stereotypes.
- The principle of maneuver has undergone a significant evolution, involving an array of aviation, sea-based, and air-based cruise missiles; naval forces; remotely piloted vehicles; reconnaissance-strike and reconnaissance-fire complexes; and aerial space equipment. The real new type of maneuver is by means of electronic countermeasures and the use of the ethereal medium.
- The principle of developing a creative approach to command and control organization has continued, making it possible to realize the requirements of other principles of military art.
- The principle of achieving victory with minimal losses of friendly manpower and materiel remains important.
- The principle of the all-around support of military forces now includes reconnaissance, electronic countermeasures, information-psychological (reflexive control, complex measures to deceive the enemy, collection of information about friendly troops, etc.), technical, and logistical support.
- The principle of the protection of military forces includes those actions against weapons of mass destruction; weapons based on new physical principles; precision, thermobaric, and psychotropic munitions; and so on.[113]

The same year, Vorobyov and Kiselev discussed basic principles of battle in *Armeyskiy Sbornik (Army Journal).* These principles appear much like the PMA:

- Constant readiness of subunits
- Decisiveness, dynamism, and the uninterruptedness in battle's conduct
- Coordinated employment of branch subunits and Special Forces, and the maintenance of continuous interaction among them

- Surprise use of actions and the employment of military stratagem (deception of the enemy)
- Decisive concentration of efforts on the main axis and at the decisive moment
- Maneuver of subunits, strikes, and fire
- Timely reestablishment of the combat capability of subunits
- All-around support of battle
- Complete exertion of moral and physical power and the use of the moral-psychological factor in the interests of executing the combat mission
- Solid and continuous command and control of subunits
- Accordance of the combat missions of units and subunits with their combat capabilities.[114]

In 2010 another definition of the PMA was offered. They were stated to be "the guiding tenets, rules, and most important recommendations regarding the organization and conduct of military operations."[115] Kiselev, this time alone, reiterated the same principles of combat he shared in the 2008 article with Vorobyov in a 2014 article in *Armeyskiy Sbornik (Army Journal).*[116]

Finally, and of importance for analysts to remember, is that the PMA, due to the increasing capabilities of weaponry, refuse to be stereotyped. Soviet military science "denies the existence of eternal, immutable principles of military art," since they can be modified by specific situations and the state of military technology. Russian authors note that "the employment of ingenious models of preparing and conducting operations" cannot be made by officers who stereotype and do not think creatively. Likewise, theorists stress the need to avoid stereotyping warfare methods in general. From noted Russian historic theoretician and commander Alexander Svechin to the current General Staff Chief Valery Gerasimov, the following short citations reinforce this Russian preference:

> 1907: We cannot stay with old stereotypes. If our concepts do not change in accordance with the progress of military affairs, if we stop at the freezing point, then, by worshipping unchanged laws, we will gradually lose sight of the entire essence of phenomena.[117] (Svechin)
>
> 1991: The task for officers lies not in using stereotypes or ossified ways of thinking or "minted coins," the latter being something ready-made. The task is to extract something different or create something new.[118] (book *Culture of Military Thought*)
>
> 2013: …technological suddenness becomes the characteristic feature of modern wars. In no less degree the suddenness is achieved by the employment of ingenious models of preparing and conducting operations and battles, by ever greater departure from the stereotype, which was developed in two World Wars.[119] (Vorobyov and Kiselev)
>
> 2016: Gerasimov noted in 2016 that "We cannot operate in stereotyped fashion. We need to seek atypical solution options which result in the achievement of the set goal."[120]
>
> 2017: General of the Army Makhmut Gareyev, one of Russia's greatest military theoreticians, stated in 2017 that the greatest enemy for the art of war is a "stereotyped and schematic approach."[121]

The impression one is left with is that as warfare evolves, there are issues that appear (use of military and nonmilitary forms and methods, advanced use of robotics and other new technologies, etc.) that must be taken into consideration. These new recommendations result in different, nonstereotyped approaches to warfare. However, Russian theorists and leaders still tend to apply terms to "types" of warfare, implying a degree of stereotyping. For example, discussions of war's characteristics from 2001 to today have included the following terms or types (listed as to where they first or most prominently appeared): noncontact and new generation warfare (NGW) (2001 Major General V. I. Slipchenko; 2013 work of Chekinov and Bogdanov); new-type (2013 General Staff Chief Valery Gerasimov and 2015 General Staff Operations Director Lieutenant-General Andrey V. Kartapolov); and classical and asymmetric (2019 Defense Minister Sergey Shoygu and 2019 Gerasimov).

Expert Discussions of Military Art: V. I. Slipchenko, S. G. Chekinov, S. A. Bogdanov, and A. V. Serzhantov

There are many Russian experts who have written on the importance of military art over the past 20 years. The four influential military authors selected above offer a progressive look at military art over the past two decades. Three authors, Slipchenko, Chekinov (in an article separate from Bogdanov), and Serzhantov, offered interesting lists of military art's development. The articles authored by Chekinov and Bogdanov together were less provocative and more general.

Retired (deceased) General-Major Vladimir I. Slipchenko wrote often and with great fanfare in the late 1990s and early 2000s on Russian military issues. One of his most prominent works was the 2001 *Noncontact Wars*. In this book, he outlined not only the various generations of warfare but also his perceptions of noncontact and new generation warfare concepts. In his view, they would occur after 2010. Slipchenko noted that the PMA would be filled with new content and new meaning. He then listed the following:

- There will be compressed simultaneous operations of reconnaissance-strike combat systems created especially for destroying the enemy's economy, wars in which variously based high-precision weapons will become the principal means of destruction. Most weapon platforms will not be in direct contact with the enemy.
- The influence of nuclear weapons on attaining strategic and political goals will diminish sharply and perhaps will disappear entirely. Nuclear weapons will be retained in the inventory of several countries, but no one will employ them in critical situations of any kind.
- Groupings of ground troops, forces, and assets and battlefield weapons will cease to be necessary in connection with the noncontact nature of wars.
- The efforts of armed force branches and combat arms will be coordinated in two interconnected but opposite directions—operations of strategic nonnuclear strikes and strategic defensive forces and assets.
- Of the three elements of the battle and engagement familiar in the past (fourth) generation of wars—fire, strike, and maneuver—only the strike by high precision forces and assets launched from zones beyond the reach of the defending side's weapons will be preserved.[122]

In 2010, S. G. Chekinov forecasted the evolution of military art at the start of the 21st century on the pages of *Military Thought*. Chekinov focused on the

methods associated with producing next-generation weapons and their employment in armed struggles. He noted that as scientific knowledge is applied, "new means of warfare are invented" and outdated ones are modernized or cast aside. This results in the development of new forms and methods of strategic and operational concepts and in the planning and conduct of actions in theaters of operations.[123]

Chekinov offered a host of US lessons learned from the war in Iraq that, he noted, demonstrated the following trends in warfare:

- Constantly improved weaponry is a new trend in military art's development.
- The method of quickly introducing new weaponry has created a new time factor in military art.
- The technological superiority of one side can easily offset a quantitative superiority of the other side.
- There was a clear absence of lines of contact between warring sides.
- Space technology supported combat at all levels of military art.
- Reconnaissance, fire, electronic, and information warfare facilities were integrated into a single spatially dispersed reconnaissance-strike system.
- Military space may include the use of orbiting weapons that can hit targets at any point on the planet, offering a global dimension to armed struggle.
- Information warfare will evolve into an independent form of struggle.
- New warfare approaches will improve the organizational factor of the armed forces.
- Greater weight will be given to long-range fires delivered by high-precision weapons.
- Electronic warfare has become a key element in disorganizing an opponent and undercutting its combat potential. It accounts for about a third of capabilities, along with nuclear and conventional weapons.
- The nature of future war will involve a war of surprises in the full sense of the term, using unknown weapons and new methods of military operations.
- Remote operations will prevail over contact operations.[124]

Chekinov's conclusion was that recent US wars have demonstrated a significant change in the forms and methods of operations for the course and preparation of strategic operations.[125] Foresight as to how wars will start and end must include the assumption that "so-called information weapons will be able to paralyze the enemy's poorly defended computerized troops and weapons control systems" and thereby deprive an opponent of its capability to transmit information. Further, "armed struggle in the future will spill over into outer space" and could include geophysical weapons and weapons based on new physical principles, such as "radio frequency, laser, infrasonic, psychotropic, genetic, ethnic, beam, acoustic, electromagnetic, and other weapons."[126] Chekinov stated that Russia must be prepared in advance for war, thereby underscoring the article's title that included the phrase "the initial period of war." New forms of warfare will be multidimensional and fought in all areas with the aim of achieving fast results while blocking an opponent's initiative and freedom of maneuver. Amid a new revolution in military art, classical wars are replaced with wars developed based on advanced technologies.[127]

In 2015 Chekinov and Bogdanov wrote two articles on military art. Early in the year, they stated that the idea of war includes not only direct military interference but also economic, diplomatic, ideological, and other

kinds of confrontation as essential constituents.[128] Military art was defined as the ability to apply knowledge about war. Military art interacts with nonmilitary measures and indirect actions.[129] Modern information activities now have reached the strategic level, able to disorganize military and state governance and systems of aerospace defense. Such activities also include the ability to delude adversaries by creating a desired public opinion, organizing antigovernment demonstrations, and conducting other events to reduce an opposing side's determination to resist.[130]

The authors stressed on several occasions that 21st century military art will encompass its constituent theories, other forms and methods of struggle, and military stratagems and surprise.[131] The development of forms and methods of fighting will be influenced by technological breakthroughs related to aerospace weaponry modernization, weapons based on new physical principles, robotized technology, the computerization of command and control assets, and the creation of artificial intellect.[132] Command and control efficiency will require a single information analytical and control space, fundamentally new principles of work algorithms for command and control organs, and robotized systems with enhanced stability, associativity, and interference immunity.[133]

Problems remain for the advancement of military art in Russia, however. They include the following: staff units of command and control do not match the number of tasks set before them, existing control systems are in need of reform, a single system of logistical support needs to be created, and a legal basis is needed to define the order of subordination of elements to the unified command.[134]

In late 2015 the same authors advanced their theory of military art in the context of military systemology. Military art's primary task, they noted, is generating effective methods of conducting a war.[135] Military systemology was defined as:

> A theory of systems fulfilling military purposes… It develops its own tool kit (definitions of concepts, criteria for quantifying effectiveness, methods, models, and methodologies serving various purposes) to conduct research from a common vantage point of modern military theory and practice. As a set of conceptual systems used for military purposes, military systemology studies primarily military science, in general, and military art as its principal component.[136]

Military art must be studied as a system with three components, an integral whole, a complex unit (one consisting of many elements), and an element of a supersystem (an indivisible unit).[137]

The authors noted that both strategy and tactics are used often in sciences well beyond military science. Operational art, on the other hand, belongs only to military art and science. It can also be thought of as "programming art." It is necessary to guess ahead about the end goal and to include the human factor or personnel; the technical factor or vehicles and weapons; and the natural factor or terrain features, weather, and other processes on the ground.[138] The authors summed up their analysis with this paragraph:

> To sum up, the synthesis of the definitions of the concepts strategy, program (operational art), and tactics reveals the relationships between them: strategy is an art of reflecting the tasks

> fulfilled by the system through its problems; program (operational art) is an art of reflecting the problems of the system through its objectives; and tactics is an art of showing the objectives of the system through the tasks it fulfills.[139]

The authors added that a problem is a model of disharmony, an objective is a model of harmony, and a task is a model of the transition from disharmony to harmony.[140]

Finally, in 2019 Alexander V. Serzhantov, the Deputy Chief of the Military Academy of the General Staff for Scientific Work and Chief of the Center for Military Strategic Research, discussed military art. Ten years earlier he was the deputy chief of the Military Art Chair at the same Military Academy.[141] His interest in military art clearly continued, as he noted that roles among the spheres of armed confrontation include not only traditional ones (land, sea, etc.) but new ones, such as social, digital, energy, and others. He stressed that the center of power struggles in the world have shifted to the aerospace, information, and economic administration spheres; and that military operations of the future are associated with the following issues:

- The constant threat of a surprise preemptive electronic-fire strike
- The use of new types of weapons
- The lack of front lines and the exposure of open flanks
- The struggle for the initiative
- Dramatic changes in the situation.[142]

Serzhantov then stated that the following changes in military art are deserving of the closest attention of researchers:

- The concentration of personnel and equipment on the decisive axis will be determined by the massive employment of weapons, not troop maneuvers.
- Strategic weapons can be used in support of missions at the operational and tactical levels.
- Offensive and defensive operations will converge with the combination of fire and electronic strikes in the future.
- New methods are needed for transforming operations from contactless war into contact war.
- The disablement of an opponent's political and economic management infrastructure facilities, communications, and electronic warfare systems is acquiring special significance.
- Air defense systems will have to be hardened and jam-proofed and become echeloned and multilevel.
- The need for ground troops continues.
- Fire destruction of an opponent prior to the moment of close contact will ensure the continuity of the offensive, surprise, and the momentum of strikes.
- The fight for air supremacy will be an important characteristic of engagements.[143]

Serzhantov's analysis closely follows what Gerasimov discussed in his recent presentations at the Academy of Military Science, including Gerasimov's statement that it is now necessary to wage wars and armed conflicts using classical and asymmetric methods of operations. Serzhantov noted that based on the strategy for achieving goals, operations can be classic (the strategy of the destruction and attrition of the enemy) or asymmetric (the strategy of indirect operations).

To summarize, early on it was difficult even for US experts such as the Scotts to locate and identify Russia's PMA. In the past decade this has become easier. The focal point of Russia's PMA is recommendations for action. Combat experience over the years, developments in weapon capabilities and new technological achievements, and the situational creativity of commanders all cause changes in the PMA and indicate that they will always be in a state of flux and cannot be stereotyped. Some general categories do exist (new generation, new type, asymmetric and classical, etc.) but even under such categories commanders still influence the application of the PMA when they inject their own creativity to influence outcomes in their favor.

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