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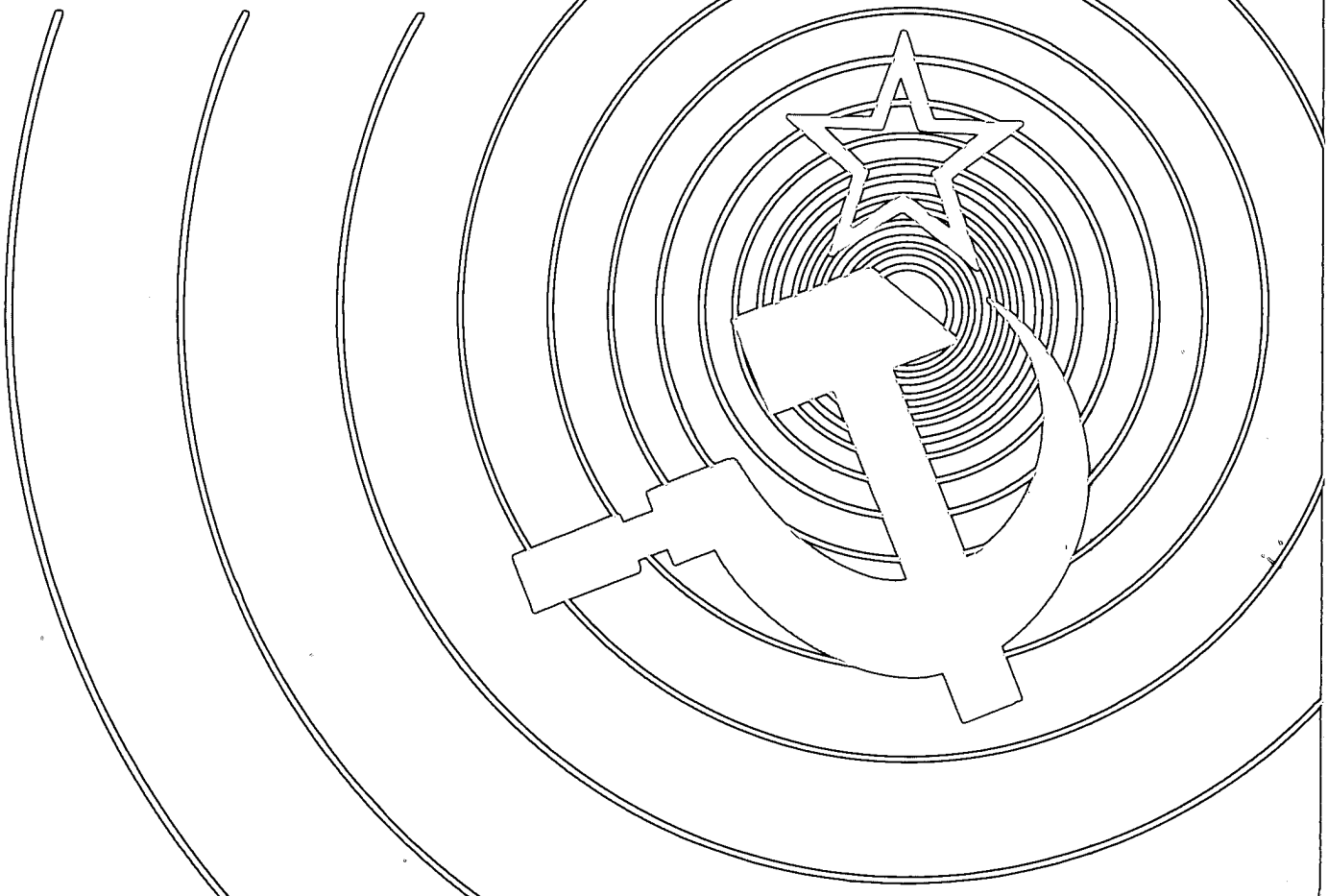

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The Role of Staff Culture in the Development of Soviet Military Theory

By Dr. Jacob W. Kipp

FROM AN AMERICAN perspective, nothing sounds so strange as the words culture and theory juxtaposed in the title of this article. Yet in the Soviet military lexicon, these terms are connected intimately and shed special meaning upon the process of doctrinal development now transpiring in the Soviet military regarding command, control, communications and intelligence (C^3I). Staff culture is an alien term to the U.S. military where there is no tradition of a general staff as a repository of military theory. Staff culture has been defined by the Soviet military as a totality of qualities that make for "successful control action."[1] While the concept embraces many aspects familiar to graduates of the U.S. Army Command and General Staff College, including the ability to draft field orders quickly, accurately and in a superior fashion, it also extends to the general level of education of the officer and implies a commitment to continued professional study. Officers of the Soviet General Staff are to be autodidactic, i.e., to continue their professional education after completion of their formal military schooling.[2] Recently, P. A. Zhilin, Director of the Soviet Academy of Sciences Institute of Military History, called attention to B. M. Shaposhnikov's interest in military history as one aspect of staff culture. Zhilin approvingly notes that the genshtabist devoted two hours every day to reading new books, including professional works on military theory and history.[3]

Gen. Iu. V. Chuev

Gen. Iu. V. Chuev came to prominence in the early 1960s when he authored a study of U.S. cruise missiles. While this technology has again assumed strategic importance with a new generation of cruise missiles, which have radically improved flight and guidance characteristics, in the 1960s Soviet air defense specialists attached to *PVO Strany* had to consider U.S. plans for the development and deployment of such ground-to-ground and air-to-ground systems in Navaho and Hound Dog as major strategic threats. In his assessment of the threat, Gen. Chuev did not confine his remarks to existing systems but tried to determine the likely course of future cruise missile development. He pointed toward two contradictory trends: the effort to increase speed and height by using rocket planes and the search for concealment from air defense forces by reducing the flight altitude.[8]

In his volume on cruise missiles, Gen. Chuev cited only 14 items in his bibliography, but one of these works had a profound impact on the further development of his career. The work was a Russian translation of U.S. work on operations research.[9] The Soviets translated such works in the 1950s, and Gen. Chuev appears to have been one of the first officers to embrace the method. In 1965, he was the chief author of one of the first volumes on operations research written for the Soviet armed forces.[10] Gen. Chuev quickly came to the forefront of Soviet applications of operations research to military affairs. In 1967, he and I. B. Pogozhev published an article on "hierarchical system of task optimization," which put them into the vanguard of those researchers in the Soviet Union searching for ways to bring about the "mathematization of knowledge." Gen. Chuev's publications, which were extensive over the next several years, often involved co-authors and frequently appeared in publications of the All-Union Academy of Sciences or those of a republic academy. These articles put Gen. Chuev in the company of Soviet academics who were trying to develop and apply cybernetics to system control and the "scientific organization of labor." This is a topic that Adm. A. I. Bero, a scholar and engineer with close ties to the development of Soviet radar, had linked to the growth of cybernetics in 1962.[11]

In 1970, Gen. Chuev published what became the standard Soviet military work on the application of operations research to military affairs. A year later, he collaborated with G. P. Spekhova in a work devoted to "technical tasks of operations research," which was intended for "leading workers of scientific-research institutes, construction bureaus and enterprises, engineers engaged in planning any technical structures and students of higher technical institutes."[12]

When B. M. Shaposhnikov wrote of the general staff as "the brains of the army" in the 1920s, he was drawing attention to what would become one of the chief continuities between the tsarist and Soviet armies, i.e., the central role of the general staff in the development of military science, art and doctrine. While Shaposhnikov spoke of an absolute subordination of the armed forces to the civil

authority of the Communist Party, he clearly viewed the general staff and its officer corps as the logical centers for the exercise of foresight and military planning.[4] Shaposhnikov was concerned, along with other senior Red Army commanders in the 1920s, with the problem of "future war," which occupied a conspicuous place in the speculations of such Red Army intellectuals as V. K. Triandafillov and M. N. Tukhachevsky.[5]

Appointed Chief of the General Staff in 1937, Shaposhnikov served in that post until 1940 when he was replaced by K. A. Meretskov and then G. K. Zhukov. However, with the outbreak of the war, Shaposhnikov resumed leadership of the General Staff, serving until 1942 when declining health compelled him to give up his duties. Appointed Deputy Commissar of Defense in 1942, Shaposhnikov still retained his close ties with Stalin, Stavka and the General Staff. From 1943 until his death in 1945, he served as Chief of the Military Academy of the General Staff. In these various roles, Shaposhnikov had a profound influence on the development of staff culture.[6] M. V. Zakharov, one of Shaposhnikov's subordinates and long-time Chief of the General Staff (1960–1963, 1964–1971), gave the clearest expression to this function of the general staff as the "unwinking eye," charged with gazing into the future while not losing sight of the general trends of development in military affairs.[7]

Examined in this light, the writings of general staff officers take on special importance for the Soviet military system. The military education system places a high premium on writing and publication of works in military science. Senior officers continue to publish, act as editors for author collectives and play a leading role in formulating new innovations in military theory and science in that process John Erickson has so well described as "ordered ferment."

This article will not discuss a particular case of ordered ferment, but will examine the intellectual biographies of three Soviet officers who have made major contributions to the development of air defense theory in the period of the scientific-technical revolution in military affairs: Gen. Iu. V. Chuev, Gen. V. V. Druzhinin and Gen. I. I. Anureev.

Four years later, Gen. Chuev joined Iu. B. Mikhailov and V. I. Kuz'min to author *Forecasting Collective Characteristics of Processes*, which, like his earlier work with Spekhova, appeared under the imprimatur of *Sovetskoe Radio*, a publishing house with close ties to the defense establishment. In the same year, Gen. Chuev and Mikhailov also collaborated on *Forecasting in Military Affairs*. In this volume, the authors provided a textbook introduction for officers and scientific workers to the application of futuristic, mathematical and composite forecasting techniques to military affairs. They specifically acknowledged the methodological linkage between their efforts and the work done by others in the areas of systems analysis. They called special attention to the work of Dzh. M. Gvishiani of the Soviet Academy of Sciences. While foresight has been a recognized element of military planning for well over a century, Gen. Chuev and Mikhailov sought to differentiate foresight from forecasting. Forecasting involves the application of mathematical techniques to a broad range of tasks: "forecasting the military-political situation and related problems in the fields of strategy, operational art, and tactics . . . the quantity and quality of the armed forces and the characteristics of weapons and military equipment."[13] Under contemporary conditions with rapid changes in technology a reality, the timeliness of forecasts has taken on even greater importance.

Gen. Chuev then went on to author the entry on systems analysis in the *Soviet Military Encyclopedia*. He described it as a "method for preparing well-founded solutions to complex problems of a political, military, social, economic, and technical nature."[14] Squaring the circle, Gen. Chuev informed his reader that operations research was seen by the 1970s as a part of systems analysis and that both operations research and systems analysis could be applied to the resolution of a wide range of problems, including determination of major policy alternatives, planning and development of weapons systems, selection of alternative tactical solutions in combat situations and supervision of rear services and logistics.[15]

In this brief treatment of Gen. Chuev's published works, we can see his growth and development from the immediate, practical concerns of his early work on cruise missiles to problems of cybernetics and troop control via operations research and concluding with an involvement in the application of systems analysis to forecasting. He has been in the forefront of what Soviet authors, notably LTGen. M. M. Kir'ian, have identified as the second stage of the scientific-technical revolution in military affairs, i.e., the application of cybernetics to the problem of troop control.[16]

Gen. V. V. Druzhinin

Gen. V. V. Druzhinin, like Gen. Chuev, came to prominence in the 1960s when he authored a volume on the radar electronic warfare troops of *PVO Strany*. This volume, which was published by DOSAAF (The Volunteer Society of Assistance to the Army, Aviation and Navy), was intended for a broad audience, especially Soviet youth who were described as the "future fighting men of *PVO Strany*." Gen. Druzhinin described the radar electronic warfare troops (*radiotekhnicheskie voiska*) as the third leg of the *PVO troika* and the "eyes and ears of modern air defense."[17] Gen. Druzhinin's earlier ties with *PVO Strany* are unclear. Thanks to research by Professor John Erickson, the author was able to identify one V. V. Druzhinin, who in the postwar period seems to have been employed in the Physics of Metals Institute at Sverdlovsk. This Druzhinin published frequently in the Academy of Sciences journals on topics relating to ferromagnetism.[18] The author has not been able to establish definitively whether this is the V. V. Druzhinin of *PVO Strany*. However, the area of interest for a Soviet officer-engineer is not all that remote and would have put him in the field of electrical engineering with an interest circuitry.

In 1982, V. V. Druzhinin authored a brief article on General of the Army A. F. Shcheglov on the occasion of his 70th birthday. Shcheglov joined *PVO Strany* in 1949. An officer of the General Staff, he was appointed commander of the Baku Air Defense District in 1959. In 1966, he became First Deputy Commander of *PVO Strany*, holding that post until 1974 when he was assigned to the air defense staff of the Warsaw Treaty Organization.[19] Since it is Soviet practice to have junior officers write such retrospective articles on senior commanders, it is likely that V. V. Druzhinin served under Shcheglov, probably during the latter's tenure as First Deputy Commander of *PVO Strany*, 1966–1974.

During this period, Gen. Druzhinin coauthored one of the most intriguing and stimulating works on

decision making and automation in troop control. This volume, *Concept, Algorithm, Decision* appeared in 1972 as part of the Officer's Library series and was intended for "commanders, operators, and engineers, desiring to complete and deepen their knowledge in the area of means of automation for the preparation of decisions." *Voennoe Izdatel'stvo* published the volume in a 30,000 edition. The book also carried an introduction by General of the Army S. M. Shtemenko (1907–1976), who then was serving as First Deputy Chief of the General Staff and Chief of Staff of the Unified Armed Forces of the Warsaw Treaty Organization.[20] In his introduction, Shtemenko admitted his initial reluctance to write a foreword to what he considered a narrow, technical study. On reading the manuscript, however, he concluded that the book was an asset to any profession because it "forces one to think" about decision making in automated control processes.[21]

Concept, Algorithm, Decision explored the problem of bringing computer technology into the staff process. Since modern air defense forces were one of the first areas of warfare dealing with complex, dynamic threats within short periods of time involving the coordination of combined arms teams (radar electronic warfare forces, surface-to-air missile batteries, and interceptor aviation), the ability of staffs to make timely and appropriate decisions had taken on critical importance. Gen. Druzhinin and Kontorov were trying to get other military staffs to recognize the need for structuring the man-machine system in order to optimize decision making in a variety of military situations.[22] As the authors stated the problem:

> The processing of information at the conceptual level will become a routine activity in the very near future. Thanks to automation, collective thinking will become a potent factor in progress. The combined experience, group activity and intellectual integration of commanders, operators, and engineers in situation analysis and decision making will immeasurably enrich human capabilities and will create new prospects for progress.[23]

Speaking of the computer as a consultant, assistant and comrade-in-arms, the authors presented various approaches to staff information management with an eye toward improving troop control and combat effectiveness in modern combat operations.[24] A shortened version of the three sections of the book dealing with organizational decision, operational decisions and collective activity appeared in *Voennaia mysl'* in the same year the book was published, suggesting that the dissemination of this information was deemed of substantial importance by the General Staff.[25]

It could be reasonably argued that Gen. Druzhinin's and Kontorov's concerns about automated decision making were so far in front of Soviet capabilities that the theme was remote from the practical concerns of serving officers. But such a view misses the central point of staff culture, which is to articulate approaches to future problems and thus begin their resolution. In the Soviet military, theory does not emerge full-blown. It evolves out of a tension between theory and praxis where the former directs the latter and in turn, is informed by it.[26] Thus, *Concept, Algorithm, Decision* should be seen as a part of an ordered ferment, just then beginning over the process of adapting staff practice to the revolution in troop control, at a time when the technical characteristics and potential of that process were not yet completely clear.

Gen. Druzhinin and Kontorov have continued their collaboration and in 1976 they published *Problems of Military Systems Engineering*. The term military systems engineering is a translation of the Soviet term *sistemotekhnika*, which is a most recent addition to the Soviet lexicon. According to the *Military Encyclopedic Dictionary*, military systems engineering embraces "the decision of the complex of theoretical and practical tasks which arise in the planning, designing, and development of large-scale systems (complex systems) such as PVO, PRO, PKO, ASUV (air defense, rocket defense, space defense, and automated systems of troop control) and others."[27]

The Gen. Druzhinin and Kontorov volume on military systems engineering contains a number of interesting features including the emphasis upon adapting the art of leadership to the demands of the latest round in the scientific-technical revolution in military affairs. Art in this context, however, is not simply the traditional concept of art as practice but embraces art as the linkage between the numerous natural and social sciences upon

which contemporary military stands. For the authors, art as an approach to control processes is grounded in a dialectical world view that seeks out and examines the interconnections and interdependencies of all processes and phenomena in their totality and unity.[28] Military commanders have always engaged in "doing their sums," but Gen. Druzhinin and Kontorov demand that officers move from stereotyped, intuitive, decision making to scientific foresight with the aid of mathematical techniques. Here art and foresight join in a competitive process in which one commander attempts to use them "to discern the course of the enemy's reasoning and to forestall and direct his actions." For the authors, decision time has become the most crucial element of this latest revolution in military affairs. The infusion of cybernetics and mathematized knowledge into the command process has become a key to freeing the commander from uncreative functions and to speeding up the decision cycle.[29]

System engineering embraces much more than aiding officers to make prompt decisions in combat situations. Modern weapons systems demand a systematic approach to weapons development decisions within the context of the complex interdependencies and interconnections affecting all combat arms and embracing those of the probable opponent. In contradiction to the sterile debates often heard about offense and defense as principles of war, the authors introduce the crucial qualifiers of initiative, surprise and *maskirovka*. If an adversary has superior intelligence, initiative can be an invitation to defeat. Surprise still can be decisive, provided that optimal use is made of the speed, range and striking power of modern weapons. *Maskirovka* as deception, concealment and disinformation, still can serve to confuse an opponent. The key lies in the search for an optimal relationship between initiative and surprise. In modern battle, the commander who relies upon Suvorov's intuitive instinct to seek maximum concentration and decisive action to grasp the initiative takes a grave risk. Initiative without adequate information invites defeat. Adequate information, however, is a relative term, reflecting a commander's advantageous position vis à vis his opponent.[30] The case for the radical transformation of C³I as a decisive element of modern war could not be put more strongly.

Gen. I. I. Anureev

Unlike Gen. Chuev and Gen. Druzhinin, MGen. I. I. Anureev was not connected with *PVO Strany*. Gen. Anureev was much closer to the altar of staff culture than either Gen. Chuev or Gen. Druzhinin. He apparently joined the Voroshilov Academy of the General Staff in the 1950s, about the same time that M. D. Sokolovsky's *Voennaia strategiia* was being written by a collective of authors associated with the academy. Marshal Sokolovsky served as Chief of the General Staff in the 1950s and *Voennaia strategiia*, which listed him as editor-in-chief, appeared to have been done by members of the Academy's staff. Revised in 1963, a year after its appearance, the work went through major revisions in the mid-1960s for the third and final edition in 1968. Gen. Anureev, a graduate of the academy and a long-time staff member, was already involved in working out theoretical problems associated with fighting a nuclear war.[31]

In the 1960s, Gen. Anureev, along with other officer instructors at the Academy of the General Staff, explored the application of mathematical models and cybernetics to command and control problems. In September 1966, he published an article on that topic in *Voennaia mysl'*.[32] He followed this with an article on using mathematical techniques for determining the correlation of forces in a nuclear war. In this article, Gen. Anureev transcended the categories of counter force vs. counter-value targetting to embrace the concept that top priority in such exchanges should go to command and control capabilities.[33] The entire exposition of his argument was in terms of an appropriate model that would embrace the interactions and interdependencies in the conflict. In his conclusion, Gen. Anureev called for detailed studies "to find the optimal variants of combat operations of nuclear forces and the possibilities of applying scientifically-based foresight and use them correctly in combat operations of modern warfare."[34] If a further clue was necessary regarding Anureev's ties with the operational concerns of the Strategic Rocket Forces, it appeared in 1968 when he coauthored a 10 year retrospective on the Soviet space program.[35]

Gen. Anureev's later articles and books expanded upon his earlier themes. In the summer of 1971, Gen. Anureev made a compelling case for the application of mathematical modeling to military decision making. He put his argument squarely within Marxism-Leninism's laws of the dialectic as applied to warfare and emphasized the compatibility between an historically grounded phenomenology and the application of mathematical models to achieve foresight in military affairs. Such modeling could make it possible to test a wide range of alternative solutions until an optimal one could be found.[36]

In the same year, Gen. Anureev put his proposition to the test by publishing a major study on antimissile and space defense weapons.[37] He began this volume with a treatment of the ballistic missile as a qualitatively different weapons system, considered early efforts to counter such weapons beginning with the British attempts against the German V-2's, and then treated the interactions and interdependencies of strategic offensive and defensive systems. Gen. Anureev concluded that antimissile and space defense were future areas of weapons development, but he viewed the technologies upon which systems could be based as still in their infancy.[38] In the context of the then ongoing SALT I negotiations, Gen. Anureev's work made a compelling case for offensive force modernization and deployment and the acceptance of restrictions upon antimissile and space defense technologies. Their potential was as yet unknown.[39] Gen. Anureev did, however, have a very good idea of the direction of weapons development. In 1972, he authored an article pointing to trends in the development of the natural sciences and military sciences that might work qualitative changes in military affairs. He pointed specifically to laser and particle beam development.[40]

Gen. Anureev joined an author collective, composed of staff at the Academy of the General Staff, to contribute a chapter to a book on scientific-technical progress and the revolution in military affairs. Although Professor Colonel-General N. A. Lomov was listed as the chief editor, it was, in fact, Col. M. I. Galkin who headed up the authors collective. Gen. Anureev contributed a chapter devoted to "the characteristics of new means of conducting war," in which he discussed nuclear weapons, their delivery systems, various types of military satellites, ABM systems and means of space defense.[41] Troop control featured prominent-

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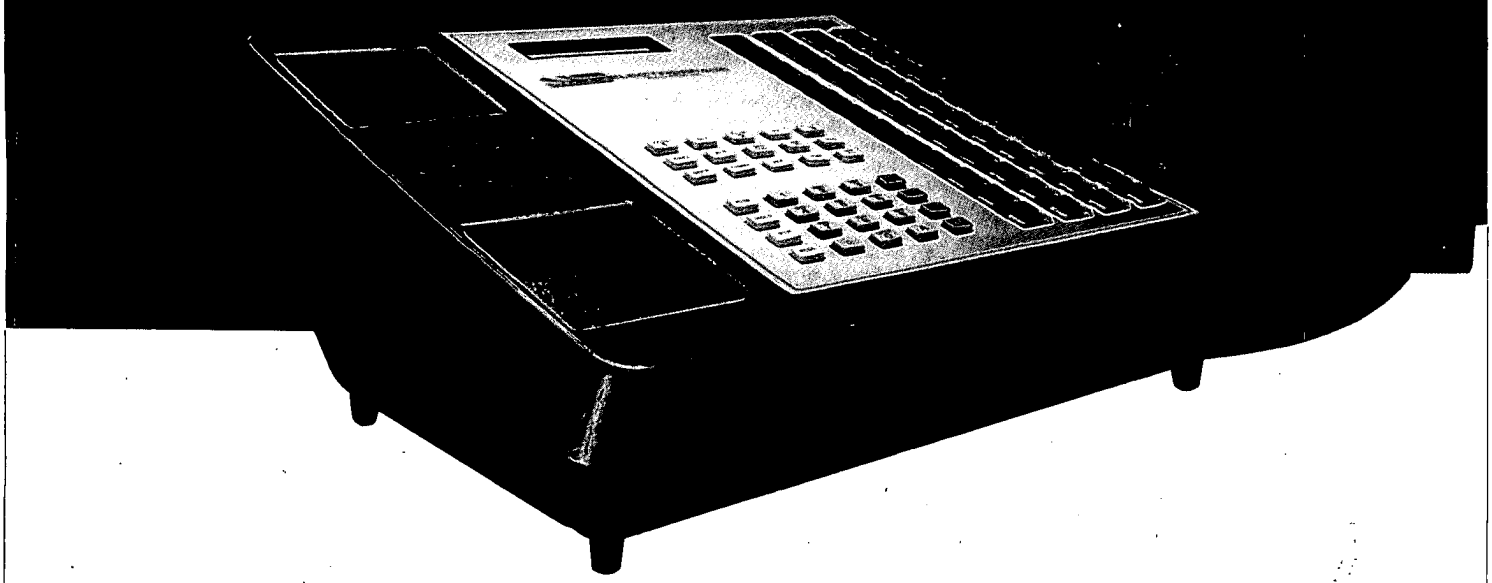

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ly in Gen. Anureev's analysis of the strategic dimension of the scientific-technical revolution in military affairs. He predicted that the pace of such changes would accelerate, bringing about "revolutionary changes in military affairs."[42]

In 1975, Gen. Anureev was already a senior consultant at the Academy of the General Staff and a respected member of its Scientific Council.[43] At that time, he published a volume on multiuse space transports based upon NASA's plans for the development of the "space shuttle." Although published by *Voennoe Izdatel'stvo*, this volume contained few references to the militarization of space or the Pentagon's plans for the use of the Shuttle. Instead, it was a rather judicious evaluation of the proposition that reusable space transports would make it possible to begin the exploitation of space in earnest. Gen. Anureev did note that Pentagon requirements for the modification of the Shuttle were likely to increase the Shuttle's costs and reduce the cost benefits of such craft.[44] In an era of detente, his argument was that such craft provided one possible road to the exploitation of space. Gen. Anureev's volume appeared six years before the U.S. Shuttle became operational and should be considered an exercise in military systems engineering: an effort to get a timely assessment of the potential and impact of a potential adversary's future technology so that timely and appropriate decisions could be made on the Soviet side. Since it appears that the Soviets themselves are testing a smaller space plane and a craft of similar characteristics to the Shuttle, it would appear that their assessment of such technologies was positive.[45]

In conclusion, these brief comments on the intellectual biographies of three senior Soviet officers suggest much about the role of staff culture in the development of Soviet military theory and its application to the revolution in troop control. Western analysts would do well to examine the corpus of such officers' publications as a way of assessing the evolution of Soviet military theory.

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Footnotes

[1]*Voennyi entsiklopicheskii slovar'*, (Moscow: Voenizdat, 1983), p. 821.

[2]The entire point of works like the series "Officer's Library" is to encourage Soviet authors to read and to think about professional topics. The same theme can be found in texts from the Academy of the General Staff. A particularly good example is I. I. Shavrov and M. I. Galkin, eds., *Metodologiia voenno-nauchnogo poznaniia*. (Moscow: Voenizdat, 1977). In this work, the authors urge Soviet officers to develop their own processes of cognition and warn against the dangers of school solutions based upon internal principles.

[3]P. A. Zhilin, *O voine i voennoi istorii*. (Moscow: Voenizdat, 1984), p. 530.

[4]B. M. Shaposhnikov, *Mozg armii*. (Moscow: Voennyi Vestnik, 1927–1929), I, pp. 243–258; II, pp. 13–18.

[5]*Sovetskaia voennaia entsiklopediia*. (Moscow: Gosudarstvennoe Slovarno-Entsiklopedicheskoe Izdatel'stvo, 1933), II, cc. 834–844.

[6]B. M. Shaposhnikov, *Vospominaniia, voenno-nauchnye trudy*. (Moscow: Voenizdat, 1974). See: Marshal M. V. Zakharov's foreword to this volume for an appreciation of Shaposhnikov's importance to the modern Soviet General Staff.

[7]M. V. Zakharov, "On the Eye of World War II (May 1938-September 1939), "*Soviet Studies in History*, XXIII No. 3 (Winter 1984–1985), p. 101.

[8]Iu. V. Chuev, *Krylatye rakety (samolety-snariady)*. (Moscow: Voenizdat, 1964), pp. 77–79.

[9]Ibid., p. 84.

[10]Iu. V. Chuev et al., *Osnovy issledovaniia operatsii v voennoi tekhnike*. (Moscow: Sovetskoe Radio, 1965).

[11]*Pravda* (October 24, 1962), p. 4. For a discussion of the debate within Soviet scientific circles about the nature of cybernetics see: David Holloway, "Innovation in Science—the Case of Cybernetics in the Soviet Union," *Science Studies*, No. 4 (1974), pp. 324 ff. Chuev and Pogoshev collaborated on several articles including: "ieark-hicheskaia sistema zadach optimizatsii," in: *Materialy k simpoziumu "Issledovanie operatsii i analiz razvitiia."* (Moscow: Nauka, 1967); and "Nekotorye voprosy matematizatsii poniatiia sluchainosti i neobkhodimosti," in: *Materialy konferentsii "matemazatsii znanii."* (Moscow: Izdatel'stvo Instituta Filosofii, Akademiia Nauk SSSR, 1968).

[12]Iu. V. Chuev, *Issledovanie operatsii v voennom dele*. (Moscow: Voenizdat, 1970); and Ibid., and G. P. Spekhova, *Tekhnicheskie zadachi issledovaniia operatsii*. (Moscow: Sovetskoe Radio, 1971), inside title page.

[13]Iu. V. Chuev and Iu. B. Mikhailov, *Forecasting in Military Affairs*. (Washington, D.C.: Government Printing Office, 1979) *Soviet Military Thought Series*. Volume 16, pp. 9–10.

[14]*Sovetskaia voennaia entsiklopediia*. (Moscow: Voenizdat, 1976–1980), VII, p. 363.

[15]Ibid.

[16]M. M. Kir'ian, ed., *Voenno-tekhnicheskii progress i Vooruzhennye Sily SSSR*. (Moscow: Voenizdat, 1982), pp. 281–282. LTGen. Kir'ian is a most prolific writer with a major interest in the revolution in troop control. He authored the entry on forecasting for the Soviet military encyclopedia. See: *Sovetskaia voennaia entsiklopediia*. VI, p. 558.

[17]V. V. Druzhinin, *Radiotekhnicheskie voiska protivovozdushnoi oborony strany*. (Moscow: DOSAAF, 1968), pp. 3–4.

[18]I am indebted to Professor John Erickson of Edinburgh University for bringing to my attention the technical publications of V. V. Druzhinin. Professor Erickson, in his own extensive research of the problem of troop control, developed these leads and shared them with me. I am in his debt for much more than this information.

[19]V. V. Druzhinin, "Army General A. F. Shcheglov," *Voenno-istoricheskii zhurnal*, No. 1 (January 1982), pp. 87–89.

[20]V. V. Druzhinin and D. S. Kontorov, *Ideia, algorithm, reshinie*. (Moscow: Voenizdat, 1972), p. 327.

[21]Ibid., pp. 1–3.

[22]Ibid., pp. 21–41.

[23]Ibid., p. 324.

[24]Ibid., pp. 311–320.

[25]Druzhinin and Kontorov, "Automation and Collective Activity in the Preparation of Decisions," *Voennaia mysl'*, No. 3 (March 1972), pp. 72–89. For a further development of the theme "man-machine-system" and its impact upon military affairs see: A. B. Pupko, *Sistema; Chelovek i voennaia tekhnika*. (Moscow: Voenizdat, 1976).

[26]I. A. Grudinyn, *Dialektika i sovremennoe voennoe delo*. (Moscow: Voenizdat, 1971), pp. 14–27.

[27]*Voennyi entsiklopedicheskii slovar'*. p. 675.

[28]V. V. Druzhinin and D. S. Kontorov, *Voprosy sistemotekhniki*. (Moscow: Voenizdat, 1976), pp. 13–20. Marshal V. I. Kulikov, who provided the foreword to this volume, made this point even more emphatically: "At the same time it is necessary to realize that there is no science, particularly military science, without art, as there is no art without science." p. 4.

[29]Ibid., pp. 11–12.

[30]Ibid., pp. 21–27. Among the readers whom Druzhinin and Kontorov thank for their comments on *Voprosy sistemotikhniki* was I. I. Anureev.

[31]V. G. Kulikov, ed., *Akademiia General'nogo Shtaba*. (Moscow: Voenizdat, 1976), pp. 141–158. For the complete text of all three editions of *Voennaia strategiia* see: V. D. Sokolovsky, *Soviet Military Strategy*, edited and translated by Harriet Scott. (New York: Crane, Russack, 1984). Anureev is mentioned in the academy history as a long-time staff member and chief of a department. He also had close ties with the scientific councils of other military academies and research institutes. (pp. 188, 215.)

[32]I. I. Anureev, "Mathematical Methods in Military Affairs," *Voennaia mysl'*, No. 9 (September 1966), pp. 46–61.

[33]Ibid., "Determining the Correlation of Forces in Terms of Nuclear Weapons," *Voennaia mysl'*, No. 6 (June 1967), pp. 35–45. For a review and commentary on Anureev's views see: B. Khabarov, N. Bazanov and L. Semeyko, "Methodology of Determining the Correlation of Nuclear Forces," *Voennaia mysl'*, No. 8 (August 1968), pp. 57 ff.

[34]Ibid., *Voennaia mysl'*, p. 45. In 1967, Anureev collaborated with another member of the Academy's faculty to produce a volume on the application of mathematical methods to military affairs. See: I. I. Anureev and A. E. Tatarchenko, *Primenenie matematicheskikh methodov v voennom dele*. (Moscow: Voenizdat, 1967), pp. 55–64.

[35]N. Kamarin and I. Anureev, "Ten Years of Exploration of Space," *Voennaia mysl'*, No. 10 (October 1967), pp. 55–64.

[36]I. Anureev, "Methods of Military Science," *Voennaia mysl'*, No. 8 (August 1971), pp. 37–43.

[37]I. I. Anureev, *Oruzhie protivoraketnoi i protivokosmicheskoi oborony*. (Moscow: Voenizdat, 1971), pp. 1 ff. Anureev began with a discussion of ballistic missiles, considered space weapons, and concluded with a treatment of ABM and space defense weapons systems. He stressed repeatedly the interconnections and interdependencies of offensive and defensive weapons.

[38]Ibid., pp. 197–200.

[39]Ibid., pp. 236–250.

[40]I. Anureev, 'The Correlation of Military Science with the Natural Sciences," *Voennaia mysl'*, No. 11 (November 1972), p. 35.

[41]I. A. Lomov, ed., *Nauchno-tekhnicheskii progress i revoliutsiia v voennom dele*. (Moscow: Voenizdat, 1973), pp. 3, 39–72.

[42]Ibid., p. 72.

[43]Kulikov, *Akademiia General'nogo Shtaba*. p. 215.

[44]I. I. Anureev, *Rakety mnogokratnogo ispol-'zovaniia*. (Moscow: Voenizdat, 1975), p. 205.

[45]James E. Oberg, "The Ellusive Soviet Space Plane," *Omni*, (September 1983), pp. 126–129, 143.

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