Close Encounters in War Journal – n. 5 (2022)

Science, Technology and Close Encounters in War

By the editors

The fifth Issue of the *Close Encounters in War Journal* addresses the topic "Science, Technology, and Close Encounters in War". The interconnection among these three fields of human experience has always been strong and controversially fruitful. Since prehistoric flint-headed arrows and spears evolved from hunting tools into weapons, all the different peoples introduced technological innovations that changed the face of warfare. Hittites fought on charts; the Greek infantry consisted of heavy-armoured hoplites; Roman legionnaires fought with the deadly iron *gladius* and invented innovative war machines and techniques to besiege enemy cities and fortify their positions; and Frank horsemen used the stirrup to ride stably, thus giving birth to modern cavalry. In medieval Japan, the Samurais fought with the *katana*, a sword that was a masterpiece of metallurgy and craftsmanship. During the sixteenth century, firearms appeared on European battlefields, which changed warfare forever (also inspiring Ludovico Ariosto's contempt for such a non-heroic way of fighting). Although hand-to-hand weapons remained the first source of wounding until the early twentieth century, artillery gained an increasingly dominant role on the battlefield, especially during the Napoleonic campaigns in Europe (1803-1815) and the American Civil War (1861-1865), with significant psychological effects on the soldiers. The increase in firepower rocketed in twentieth-century wars, as the millions of shells of all calibres – including gas bombs – fired on the western front between 1914 and 1918 show. During the Second World War hundreds of thousands of tons of high-explosive were dropped on Europe and Japan and two atomic bombs destroyed the cities of Hiroshima and Nagasaki. This started the Cold War and the era of the "nuclear deterrent", a new form of technological and strategic warfare that had profoundly imprinted our culture over the last seven decades.

However, the war currently raging in Ukraine seems to disprove such hopes as it has resuscitated the ghost of nuclear warfare. The Ukrainian war is the first conflict that involves the principal military power of the former Warsaw Pact, Russia, since its collapse and the end of the Cold War. Despite this war being

waged through traditional strategies – tactical manoeuvring of large mechanised units and strategic bombing –the threat of nuclear warfare has been vented more than once. Technology has played a paramount role since the beginning of the conflict in Ukraine insofar as both the Ukrainian and the Russian armies were once equipped and trained according to the same standards of the Warsaw Pact. Over the last years, however, since the Russian annexation of Crimea in 2014 and the following military escalation in the Donbas region, the Ukrainian army has been increasingly equipped with standard NATO weaponry, which has been a cause of diplomatic quarrelling between Russia and the Western Countries. The Ukrainian scenario has kindled old fears and made people aware of the profound and multifaceted entanglement of warfare, science, and technology.

Warfare involves science and technology not only with regard to increasing the destructivity of weapons and defensive devices. Science and technology enter the scenarios of war also on the levels of strategic planning, medical and logistic support, and intelligence. One may mention, for example, the effort made by a team of British scientists led by mathematician Alan Turing to crack the German coding-machine Enigma during the Second World War. New techniques in healing the wounded and sick soldiers were developed during the Crimean War (1853-1856), and war has since then represented an opportunity to experiment with new surgical treatments to cure septic affections, wounds, fractures, concussion, poisoning, mutilation, and so on, which has also given impulse to the implementation of state-of-the-art medical equipment and high-tech prosthetics. As far as industry and scientific research is undeniably involved with warfare, scientists, technicians, and technologists strive to find new ways of mitigating the negative impact of war. Chemists, physicists, engineers, medical doctors, and other scientists made enormous efforts to support the fighting troops by carrying out parallel and often obscure battles in laboratories, offices, and factories. The intertwining of science, technology, and war is, therefore, a complex and fascinating aspect of the history of war that tells much about how our perception of warfare has evolved through time.

To introduce such a multifaceted and complex topic, whose roots go deep and back into ancient times, and whose implications – ethical, epistemological, and practical – stretch into the future, we have interviewed Prof. Dr Christian Kehrt, who is an expert in the history of technology with a focus on warfare. Starting with the acknowledgement that "technology was and ever will be important for the conduct of warfare" (*infra*, p. ?), Kehrt claims that this encounter has been too often neglected by historians specialised in the two

fields, although a thorough understanding of the connection between warfare, science, and societal change is a desideratum. Through a clear and jargon-free exposition, Kehrt permits a non-expert reader to get acquainted with a complex and multi-layered topic that often implies technical imperviousness. Kehrt also warns us from indulging in simplifications: he reminds us that "science and warfare are closely interrelated" and that, therefore, "to separate science as a peaceful international endeavour from warfare as a violent and aggressive nationalistic act does not fully take into account the close and manifold interrelation of science, technology, the military and warfare" (*infra*, p. ?). Kehrt unfolds his discourse from a broad perspective that includes examples from pre-modern times (like the stirrup of medieval knights) to our present era (like the autopilot on jets). We could not hope for a more reader-friendly, yet rigorous introduction, which we are sure our readers will appreciate. Kehrt's ideas suggest that one keyword to understanding the contemporary relationship between science, technology, and warfare is "flight". The twentieth century began with the first attempt to fly a heavier-than-air machine, and over a few years, the new-born aviation became the third branch of all the armed forces involved in the First World War. The evolution of military aviation was astounding over the 1930s and during the Second World War, at the end of which the first jets (the German Messerschmitt 262) appeared in the skies of Europe. Then, ballistic missiles dominated the era of the "nuclear deterrent" and rockets made the exploration of outer space and the first human extra-terrestrial landing possible. Today, aeronautical engineering combines with robotics to create self-steering drones able to select their targets thousands of kilometres from their starting point.

The early military deployment of the aeroplane in the Great War is the object of Gianluca Cinelli's *Fighting on Flying Machines. Wonders and Horrors of Aerial Warfare in Pilots' Personal Narratives (1915-1918)*. Drawing on several memoirs of British, Canadian, German, French, and Italian pilots, the author claims that their accounts testify, on the one hand, to the enthusiastic attitude to flying. On the other hand, they also show the stressfully traumatising experience of fighting in harsh conditions that claimed a much higher rate of casualties among pilots than among other troops. By building on the existing scholarly debate about the propagandistic nature of the myths of the "aerial cavalry", "aces", and "knights of the sky", Cinelli investigates technology as a central aspect of fighting on flying machines. Pilots' "awareness of the genuinely technological nature of their war experience encompasses their mixed feelings of confident superiority, fear, and anxiety" (*infra*, p. ?). On the other hand – the author continues – even though "the mythical image of the knightly pilot was

fundamental to convince people that something noble still existed in a highly technological war [...] technology made aerial warfare a brutal slaughter nonetheless" (*infra*, p. ?). Insofar as "the outcome of any aerial combat depended not entirely on the skill and determination of the pilot, but largely on the technical superiority of his machine and the tactical advantage of the surprise attack or ambush" (*infra*, p. ?), Cinelli eventually argues that the same pilots, whose deeds contributed to inventing the myth of the "aerial cavalry", provided the most veritable testimonies of the brutal conditions of the aerial warfare in the Great War by highlighting the technological nature of their experience.

The connection between science and war does not limit to weaponry and the direct exploitation of technological know-how, as Olena Korzun shows in her article *Researching – Surviving: Agricultural Experimentation in Ukraine under German Occupation during the Second World War*, about the condition of scientists whose lives and work are affected by war. Her interest focuses on the experience of Ukrainian agricultural scientists who, during the German occupation between 1941 and 1944, were forced to find a way of continuing their research while surviving starvation and avoiding deportation. Korzun offers insight into both the German and Ukrainian standpoints, claiming that the German interest in Soviet agricultural research was paramount to granting the Reich provisions that would make it independent from import during the war: "For German agricultural scientists, the invasion of the USSR was a unique opportunity to seize international leadership in a number of areas of agricultural research, usurping Soviet scientific resources" (*infra*, p. ?). Concerning the Ukrainian scientists, the author reconstructs the strategies enforced by the Soviet authorities to evacuate the Ukrainian institutions to other regions and argues that the scientist who remained in their place, approximately 243, had to learn how to deal with the "new masters": "The best scenario for intellectuals was to continue the activities they had been doing before the war" because "it guaranteed a stable financial income, and issuance of labour cards, which exempted them from forced labour in Germany" (*infra*, p. ?). Many of them found an effective way of surviving by working on experimental farms: "A scientist could acquire a plot of land for growing agricultural plants and could work on Saturdays or Sundays at the expense of additional hours on other working days" (*infra*, p. ?). Korzun's contribution, therefore, explores an understudied page of the German occupation of the Soviet Union during the Second World War and makes a valuable contribution to the history of science.

The interconnection of science, technology, and warfare in America during the Cold War is the topic of Lucie Genay's *Conscience on Atomic Jobs: The Manufacturers of Nuclear War*, which explores "the inner struggles expressed and addressed in various ways by the manufacturers of nuclear war, the 'destroyers of worlds', who made nuclear warfare a possibility" (*infra*, p. ?). By combining different sources, from oral interviews to newspaper articles and scholarly literature, Genay studies the ethical struggles of the scientists and technicians involved in the development of the American military nuclear program with the Manhattan Project at first and later on during the Cold War. By discussing the latitude of the physicists' moral responses – from Rotblat's, Szilard's, and Oppenheimer's conscientious objection to more neutral forms of apolitical detachment – Genay claims that "throughout the decades of US-Soviet opposition, as nukespeak and markers of moral supremacy inundated political speech, nuclear workers would rely on the same better-us-than-them rationale" (*infra*, p. ?). Through the testimonies of former workers, Genay reconstructs a narrative in which patriotism, the rhetoric of sacrifice, and regret combine. The "transgenerational conscientious objection to nuclear weapons" (*infra*, p. ?) is not, therefore, such a homogeneous landscape as one would expect. Many workers accepted to take up the atomic job, despite their moral doubts and the public abjuration of some of the "fathers" of the bomb, because this was the best opportunity they could find in regions like New Mexico and Texas Panhandle if not even an act of patriotic act of service for the nation.