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# OSTENSIBLE AGILITY: THE CASE FOR MECHANISATION

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## Exercise Solo Flight

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# OSTENSIBLE AGILITY: THE CASE FOR MECHANISATION

**Major Tyler L. Collings**

## OSTENSIBLE AGILITY: THE CASE FOR MECHANISATION

*Battlefield mobility, which is more important than the ability to move fast, is still the talisman of military success.*

*~ S.L.A. Marshall*

Canada's defence policy, *Strong, Secure, Engaged,* mentions the word 'agile' 23 times and espouses concept of an "agile, multipurpose, combat-ready military," an Army that is "agile and scalable."[1] There is an implication that in order to be agile and multipurpose our ground forces should not be 'heavy' mechanized forces, yet we want Brigades that "can prevail in the most difficult circumstances – combat with an advanced adversary."[2] From this we have built brigades that rely almost exclusively on wheeled vehicles and towed artillery, yet we rely heavily on tanks in collective training, tanks that must be paired with wheeled Infantry Fighting Vehicles (IFVs), resulting in manoeuvre arms within the same formation with quite different levels of mobility. Further, the concept of agility is not exactly doctrinal, nor is the notion that Canada can more easily deploy a medium weight force, given that our strategic lift is quite limited and largely based on an airframe that can deploy everything up to a Leopard tank anyway. This is not unique to Canada; the British Army has recently undergone a major transformation where much of the same rhetoric about agile forces was used to justify lighter formations, which critics have described as "little more than another Security Force Assistance Brigade."[3] Is it that 'light and agile' are adjectives of convenience to alleviate concerns regarding reduced mechanized capabilities and their replacement with more economical forces? The potential issue here is not just that so-called agile forces may be too light to withstand full scale mechanized warfare, but that agile does not necessarily equate to mobile. Napoleon described effective manoeuvre as "the momentum in mechanics," which requires "weight plus velocity."[4] In *Armies on Wheels,* S.L.A. Marshall interprets this as a requirement to "keep one's own tanks and armoured cars moving… immobilized mobile power is only one step short of annihilation."[5] The capacity to enter a battlespace quickly in and of itself will not guarantee success, as mechanized armies, as pointed out by Marshall, "become locked and the general engagement cannot be broken off," which we have seen in Ukraine. In other words, continued and reliable mobility despite obstacles, terrain, and resistance is just as relevant as rapid deployment or agility, as modern battlefields are characterized by "a continuity necessitated by the overwhelming importance of movement."[6] If the Canadian Army intends to "field advanced capabilities to keep pace with allies" in an era of state competition, we must understand the value of mobility over agility, and invest in heavy mechanized and generally tracked, combat, combat support, and combat service support vehicles that are capable of sustained manoeuvre in any terrain against any adversary.

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[1] Canada. Dept. of National Defence and Canada. Ministère de la défense nationale. *Strong, Secure, Engaged: Canada's Defence Policy*. Ottawa, Ont.: National Defence = Défense national, 2017. Pg 36
[2] Ibid
[3] Fox, Andrew. *Matching Brainpower with Firepower – The British Army's New Ranger Regiment.* UK Land Power. <https://uklandpower.com/2021/12/14/matching-brainpower-with-firepower-the-british-armys-new-ranger-regiment/#:~:text=A%20criticism%20of%20the%20Ranger,significant%20elephant%20in%20the%20room.>
[4] Marshall, S. L. A. *Armies on Wheels*. New York: W. Morrow, 1941. pg. 164
[5] Ibid, pg 158
[6] Ibid, pg. 180

## THE HISTORY

During the height of the Great War the British developed a weapon that would change the nature of warfare in ways not witnessed since Spanish arquebusiers crushed a force of French heavy cavalry at Cerignola. While futurists such as George Chesney assumed that all wars following the Franco-Prussian War would be a limited series of dramatic decisive battles of manoeuvre, this had proven to be untrue prior to the rise of the tank. In a way he predicted the nature of future warfare, but failed to predict exactly when or how it would transpire.[7] The tank, which had developed as a tracked version of the armoured car was, according to David Lloyd George, "the ultimate British reply to the machine-guns and heavily fortified trench systems of the German Army."[8] The tank, with its continuous track would, in time, restore manoeuvre to the battlefield and influence the manner in which other Corps, such as the infantry, would fight.

The tank was not however the first armoured fighting vehicle, as the concept had been developed out of previous vehicles, most notably the wheeled armoured car that had been in use by militaries for many years.[9] The impetus to further develop the tank into a more mobile and protected platform was not so much driven by a deliberate attempt to evolve tactically, but rather by the fact that wheeled armoured cars of the time had "very poor cross-country performance."[10] Despite armoured cars having success in other, less contested theatres, the "continual shelling of the same limited area of ground, plus the vagaries of European weather, led to a secondary problem, that of getting attacking forces and their equipment across rough bare terrain which often became a sea of mud."[11] For these reasons the wheeled armoured car would find itself ironically invalidated by the destructive nature of modern warfare; relegated to secondary fronts

**Figure 1 - British soldiers with Peerless Armoured Car in Dublin, 1921. Credit: South Dublin County Council**

or rear-area security.[12] The British Army decided that if manoeuvre was to return to warfare, a vehicle was needed that

[7] Freedman, Lawrence, Inc OverDrive, and OverDrive ebook. *The Future of War: A History*. 1st ed. New York: Public Affairs, 2017. Pg. 24
[8] Crow, Duncan. *AFVs of World War One. Vol. 1*. Windsor, Eng: Profile Publications Ltd, 1970. pg. v.
[9] Ibid, pg. vii
[10] Ibid, pg. 1
[11] Ibid, pg. 24
[12] Ibid, pg. vii

could navigate rough terrain and in particular had the "ability to cross trenches" which would become "the prime requirement of their design."[13] The Royal Naval Armoured Car Division was at least initially focused on "the development of a cross country fighting vehicle," to replace their wheeled vehicles which were being shipped off to theatres where mobile operations were less contested and more plausible.[14] In a way the tracked tank was not only born out of a desire to re-introduce manoeuvre to the battlefield, or a reaction to more rapid adversarial forces, but an attempt to improve general mobility, even if those vehicles were much slower than their wheeled predecessors under favourable conditions.

The development of the tank and the mechanization of warfare eventually necessitated the development of mechanized variations of other Corps in order for them to work in concert with this new capability. According to French Lieutenant Colonel Ferré the success of the tank was due not to its heavy armour or its weapons, but rather its ability "simply to keep going," which meant that other arms would now be required to do the same, at a comparable speed.[15] Heinz Guderian recognized this during his service on the Western Front during the Great War, noting that at Cambrai the British would have achieved more success if they had reserves that were capable of keeping pace with their armoured forces.[16] Guderian also saw the limitations of early mechanized forces, in that they were not as mobile as traditional infantry or cavalry in poor ground and that despite owing their origins to a desire to return manoeuvre to the battlefield, commanders now had to consider their axis of advance much more closely than their predecessors.[17] Even in these early days of mechanized warfare it became clear to many, including Guderian, that tanks were left vulnerable without supporting infantry, a branch that had not yet been mechanized and therefore had often become exhausted by constantly advancing and the continuous nature of engagements.[18] Guderian's French contemporaries realized at Vauxcastille that artillery would have to evolve as well. Moving massed, horse drawn artillery to support large scale tank attacks was very difficult and often resulted in tanks having to halt where they were, leaving their forces vulnerable and eliminating any chance of surprise.[19] By the end of the Great War it was already becoming evident that with the advent of the tank, armies of the future would require similarly mechanized infantry and artillery. Forces dedicated to working closely with tanks motorized would need to be more than simply motorized, as truck

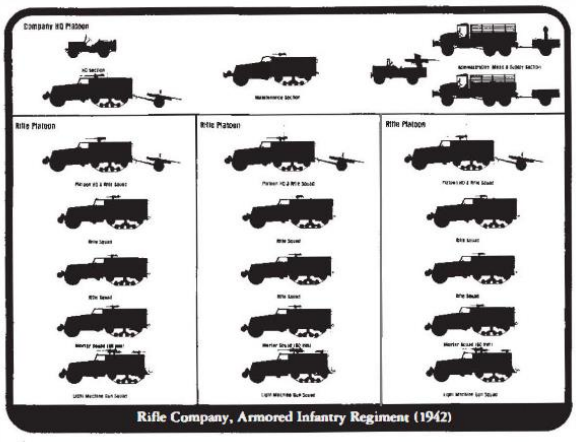
[13] Ibid.
[14] Ibid, pg. viii
[15] Guderian, Heinz. *Achtung-Panzer: The Development of Tank Warfare*. London: Cassell, 1999. pg. 61
[16] Ibid.
[17] Ibid.
[18] Ibid, pg. 66
[19] Ibid, pg. 103

mounted forces would not be as effective as forces mounted in vehicles that could operate in rough terrain and high intensity combat.

During the interwar period most of the world's major militaries would atrophy their armoured forces, including Great Britain, despite the protesting of advocates such as Liddel Hart, largely for economic, political, and psychological reasons. Perhaps surprisingly, even the Germans would rely extensively on horses from the invasion of Poland right up to the end of the Second World War with each German division averaging about 5,300 horses each, 1,100 horse drawn vehicles and a mere 950 motorised vehicles.[20] The difference however, was in how the Germans grouped and employed their limited mechanized forces, with such forces operating together in fully mechanized formations. Rather than having a force made up of tanks supported by horse drawn artillery and dismounted or motorized infantry, the Germans would group mechanized forces together, with such a formation's infantry and artillery being capable of keeping up with and fighting alongside armoured forces.[21] This is something Canada is to this day failing to do, with so called medium weight formations which are made of a mix of capabilities that could variously be described as light, heavy or medium.[22]

**Figure 2 - US Army Armour Infantry Company, 1942. Credit: M3 Infantry Half-Track 1940-73, 1994**

At the outset of the North Africa Campaign force structures had been adapted to these new realities with most combatants creating armoured divisions that paired tanks with mechanized infantry mounted in vehicles that were no longer mere motorized transport, but tracked fighting vehicles themselves. Both the Germans and the Allies had concluded that mechanized infantry was more effective than motorized infantry when forming such armoured divisions. The half-track became ubiquitous in such formations and was proven in several armour-heavy campaigns to be superior to wheeled vehicles not only in mobility, but in combat survival and utility.[23] That said, it was also realized that the half-track was still less capable than the tank itself, sometimes resulting in hasty measures to make up for this "mobility differential," such as having soldiers ride into battle on tanks, or by removing the turrets of surplus Sherman tanks, such as the Kangaroo used by British Commonwealth Infantry.[24] The more akin the infantry fighting vehicles was to a tank, the more capable that vehicle appeared to be as part of a combined arms team.




[20] McFarland, Katherine V., "Warhorses Amongst War Machines: The German Army's Use of Horses and Cavalry During World War II" (2021). *Senior Theses*. 405.
[21] Ibid, pg. 29
[22] Within 1 CMBG there exists an armour regiment with tanks (heavy), two wheeled mechanized infantry battalions (medium), one light infantry battalion, and an artillery regiment with towed guns (light?). The rhetoric is that this is a medium weight force, yet we have included tanks, which were required in low intensity conflict in Afghanistan, while failing to pair them with complimentary capabilities that would be required in combat.
[23] Haworth, W. Blair. *The Bradley and how it Got that Way: Technology, Institutions, and the Problem of Mechanized Infantry in the United States Army*. Vol. no. 180. Westport, Conn: Greenwood Press, 1999. pg. 17
[24] Ibid, pg. 18

By the end of the war the tracked Infantry Fighting Vehicle had become a common element of mechanized forces and the idea that armoured forces existed to support massed infantry had been replaced by the concept of combined arms formations made up of tanks and equally mechanized infantry.[25] The experience of the Second World War demonstrated that half-track mounted infantry was generally superior to wheeled, motorized infantry and indicated that the future of post-war infantry would probably be further mechanization towards heavier vehicles, so as to enable their mobility and protection on the modern (nuclear) battlefield.[26] It was from these revelations that Armies in the 1940s and 1950s began developing fully tracked Infantry Fighting Vehicles, such as the M44, T18, M75 and M75, demonstrating the pressing nature of Infantry mechanization in the post-war period.[27] Modern 'armoured' infantry were expected to be able to fight and manoeuvre mounted, so that they could advance across country at a similar rate as the tanks they were grouped with, while reducing casualties that would be sustained by unprotected infantry.[28]

In the American context the development of the IFV would culminate in the development of the Bradley Fighting Vehicle, which was so much more expensive and complex than the vehicle it had replaced, that despite its capabilities, would become a target for 1980's Army reformers.[29] The IFV had become important and expensive enough that critics were beginning to attack the very tenants which led to such vehicles. The Bradley Fighting Vehicle had come at a time when the US Army was reviewing much of its doctrine in the late 1970s, such as the Active Defense Doctrine issued by TRADOC in 1977 and the Divisional Restructuring Study. The rising cost of mechanized forces would result in an opposing concept that promoted 'strategically mobile,' and economical forces. The Division 86 concept would propose that the Army field two types of division, one that was heavy and able to fight in symmetric combat and one that was light, cheaper to maintain and easier to deploy.[30] The wheeled fighting vehicle was going to experience something of a revival.

Around this time Canada would introduce the Armour Vehicle General Purpose (AVGP), which were very light, wheeled, and intended only for the Primary Reserves, or those battalions that did not possess the tracked M113. The rationale was not to enable strategic mobility, as these vehicles were not initially meant to be operational, but to provide the Land Force with an armoured vehicle that was less maintenance intensive than a tracked equivalent.[31] Essentially, they were not seen as an improvement over tracked vehicles, but as an economical substitute. The AVGP's inability to replace the M113 as the mainstay of the mechanized infantry led to the Infantry Platoon Direct Fire Support Vehicle project on the 1990s, which was intended to replace the "relatively simple APC" with a "sophisticated cannon armed LCV."[32] The thinking was that as warfare continued to become more mechanized the infantry was going to be forced to

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[25] Ibid, pg. 21
[26] Ibid, pg. 23
[27] Ibid
[28] Ibid, pg. 26
[29] Ibid, pg. 124
[30] Ibid, pg. 100
[31] "Background – Armoured Vehicle, General Purpose – 6x6 AVGPs." Canadian American Strategic Review. <https://web.archive.org/web/20091007153515/http://www.casr.ca/bg-army-armour-avgp-lav.htm>
[32] Stravopoulos, G. and Canada. Dept. of National Defence. Directorate of Land Operational Research. *Command and Control of an Infantry Platoon Direct Fire Support Vehicle*. Vol. no. PR-280. Ottawa: Dept. of National Defence, Operational Research and Analysis Establishment, Directorate of Land Operational Research, 1985. pg. 16

"participate in the anti-armour battle."[33] The infantry of the future, according to Land Operational Research in 1985, would be required to "fully exploit the vehicle characteristics of – FIREPOWER – MOBILITY – PROTECTION," much like the Armoured Corps.[34] In fact some military thinkers at the time envisioned IFVs being employed as much more than "Battlefield Taxis," being used somewhat like tanks in that they could be expected to advance on the enemy mounted, providing their own integral intimate support.[35] Ultimately with the end of the Cold War and a reduction in funding, the LCV 90 as it came to be known, never came to fruition and the AVGP, intended only for training, would be required on overseas operations.

As the 1990s progressed there was little appetite for the procurement of expensive war fighting vehicles. Canada had little recent exposure to ground combat operations, such as the Gulf War, and was being shaped by experiences in the former Yugoslavia. This was occurring simultaneously to a shift in strategic thinking that Canada's military would most likely be exposed to conflicts below the threshold of full-scale war. The prevailing narrative was that the Canadian Army would move "toward the adoption of a rapid deployment force capability, based upon several, similarly structured and equipped brigades designed for mid-intensity conflict."[36] Initially the justification was not that tracked vehicles were less ideal than wheeled vehicles, but that in a Land Force that was not designed for high intensity operations, our Army "could be equipped with wheeled ICVs and ACVs" unlike an Army designed for high intensity combat, which would still require "tanks and IFVs."[37] A lighter, wheeled force, it was postulated at the time, admittedly "lacks combat power for specific missions such as advance, delay and counter moves."[38] An argument could be made that the Canadian Forces at the time was making political deductions about the future of Canada's place in world rather than the future of combat itself, as our own literature was an admission that we were equipping the Army for a low-intensity conflict of our own choosing. Democracies should rarely be the initiators of conflict, so the ability to decide when and where to be involved is predicated on Western hegemony, multilateral consensus and other factors that fail to address the most dangerous acts, such as the Russian invasion of Ukraine.

In the early 2000s the concepts mentioned above became more entrenched by the implementation of a new Army Strategy in 2002 and the publication of *The Canadian Forces Strategic Operating Concept 2020.* The former proposed further moves towards 'agility' and a medium-weight force, which wrongly predicted that by 2020 interstate war would no longer be a focus for strategic planners.[39] The Canadian narrative at the time was not being spun in a vacuum, as some of these concepts were being borrowed from the American Stryker Brigade construct, which called for medium weight wheeled forces that could be deployed by air and

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[33] Ibid.
[34] Ibid, pg. 11
[35] Rasiulis, Andrew P. and Canada. Dept. of National Defence. Directorate of Strategic Analysis. *The Impact of New Technology on Land Forces Doctrine, Strategy and Tactics - Part 1*. Vol. no. PR-147. Ottawa: Operational Research and Analysis Establishment, Directorate of Strategic Analysis, 1980. pg. 8
[36] Friesen, Shaye K. and Canada. Dept. of National Defence. Directorate of Land Strategic Concepts. *Some Recent Trends in Major Armed Conflicts, 1988-1997*. Kingston, ON: Operational Research Advisor, Directorate of Land Strategic Concepts, Dept. of National Defence, 1998.
[37] Ibid, pg. 10
[38] Ibid, pg. 12
[39] Atkinson, Peter and Army War College (U.S.). "Canadian Army Transformation: Where it Needs to Go." *U.S. Army War College*, 2004. pg. 1

moved rapidly by road. As it was determined Canada, unlike the United States, could not operate with asymmetric brigades (ie: heavy, medium, light), the entire Army would be converted, with the Leopard tank and M109 being retired from service and fire support would be provided by lightweight elements such as vehicle mounted mortars, Tow Under Armour (TUA), and the Mobile Gun System (MGS), all mounted on the Canadian produced LAV chassis.[40] The intent was for such a force to be rapidly deployable via C-130 and used in theatres below the threshold of actual warfare as "It will not be a force able to go head to head with any opponent."[41] Ultimately the concept was a failure and was essentially abandoned by 2006, leaving the Canadian Army with a medium weight force that was still reliant on tanks for fire and manoeuvre. Even before the concept could be tested, Director Land Synthetic Environment commented in a report on Army Experiment 8A that an entirely LAV based Army would be a trade-off "between tactical mobility and tactical agility."[42] Fighting in Afghanistan would prove that making politically based predictions regarding our role in future conflicts was quite difficult. The difficulties experienced during Operation Medusa would result in deductions that Canada needed heavy armour in theatre. The only such vehicle available was the Leopard MBT, not an IFV, which may not have been the ideal vehicle for a counter insurgency but was the only option (an option that was itself almost divested). The LAVIII, it was found, lacked firepower and perhaps more critically, battlefield mobility, as it was reliant on a poorly developed Afghan road network.[43] The notion that a medium weight force, largely based on wheeled vehicles, could replace a fully mechanized force was in some regards disproven by the very type of conflict such forces had been designed for.

The Russian campaign to seize Kyiv in the Spring of 2022 demonstrated the continued importance of battlefield mobility. Russian attempts to rapidly encircle Ukrainian forces failed catastrophically due in large part to an over reliance on civilian infrastructure such as roads and an inability to cross obstacles such as rivers.[44] Movement around the battlefield was especially hampered by the infamous *Bezdorizhzhia,* or "roadlessness" of the Ukrainian Spring, forcing columns of tanks and trucks to advance via road, with devastating consequences.[45] The argument could be made that the Ukrainian Spring mud was treacherous for tracked vehicles as well, with tanks getting stuck up to their turrets, but the effect on wheeled vehicles was even more pronounced. With logistics columns exclusively using roads that quickly became

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[40] Ibid, pg. 15
[41] Ibid.
[42] Denford, James S. and Army Experimentation Centre (Canada). *Army Experiment 8A: Multi-Mission Effects Vehicle in the Direct Fire System*. Kingston, ON: Army Experimentation Centre, 2004.
[43] Corrigan, Chris. "The Tank Proves itself Necessary again; Track Armoured Vehicles have been Crucial in War since 1916, Yet Canada Seems to Forget that Lesson: [Final Edition]." *The Spectator*, Apr 11, 2007. <https://login.cfc.idm.oclc.org/login?qurl=https%3A%2F%2Fwww.proquest.com%2Fnewspapers%2Ftank-proves-itself-necessary-again-track-armoured%2Fdocview%2F270269980%2Fse-2%3Faccountid%3D9867>
[44] Translated by Content Engine, L. L. C. 2022. "Ukraine: Sunken Tanks and Corpses in the Mud; the Danger of being Trapped in the East of the War." *CE Noticias Financieras*, May 26. <https://login.cfc.idm.oclc.org/login?qurl=https%3A%2F%2Fwww.proquest.com%2Fwire-feeds%2Fukraine-sunken-tanks-corpses-mud-danger-being%2Fdocview%2F2670615640%2Fse-2%3Faccountid%3D9867.History ukraine>
[45] Hambling, David. 2022. "Mud Season in Ukraine Leaves Russian Tanks Stuck in Mire." *The Guardian*, Apr 12, 38.

impassable, Russian logistics, troop movements, and casualty evacuation was greatly hindered.[46] The state of Russia's logistics fleet rendered it completely incapable of any sort of manoeuvre as much of the fleet was in poor repair, or unfit for any sort of cross country movement.[47] The most glaring example of this was a 64 kilometre long convoy that was unable to move forward for nearly two weeks due to a total inability to operate without paved roads.[48] These issues were coupled with poor strategy and tactics, with pundits pointing out that the Kyiv campaign relied too heavily on light and airborne forces, an over reliance on concepts of "Russian Hybrid Warfare," and too few mechanized forces.[49] These lessons should not be interpreted lightly, as not only did this failure to properly equip, lead and understand mechanized forces result in failed military operations, it invariably increased casualties and has led to the use of attrition tactics, not unlike how they were unwittingly adopted in 1914.

## THE PROBLEM

The Canadian Army has acknowledged the requirement for highly mobile (read tracked) forces capable of high-intensity combat on many occasions but has placed agility and strategic mobility ahead of battlefield mobility due to deductions about conflict that contradict our own history and analysis. A 1977 wargame called Bronze Rampart pitted a doctrinal Canadian Brigade Group against a peer adversary based on Soviet forces, during which all but 12% of the Brigade was destroyed and "major equipment casualties were so severe that it could no longer be considered a viable force."[50] Shortfalls were especially noted in battlefield mobility as our force "lacked the necessary protection and firepower to allow it to move during combat."[51] The Canadian commander during the exercise, W.E.J. Hutchison concluded that if the infantry was to remain relevant on the modern battlefield "it should be mounted in a vehicle that had almost the same level of protection as a tank," which arguably would require that vehicle to be tracked.[52] A report on the exercise concluded that Canadian officers "did not appreciate the speed and intensity of modern mechanized operations" and that the institution "was trying to equip organizations rather than starting with the problem and then building the solution."[53] Ultimately the study defined the optimal manoeuvre force as one "capable of executing sustained operations against a sophisticated enemy in high intensity war."[54] Much of this came down to mobility, which some reviewing the exercise concluded had to be defined as "the capacity to move under combat conditions."[55]

A team from 4 CMBG, reviewing the study on Bronze Rampart and subsequent papers published by the Canadian Forces College concluded "that only one type of infantry was

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[46] Lendon, Brad. *What Images of Russian Trucks Say about its Military's Struggles in Ukraine*. Atlanta: CNN Newsource Sales, Inc, 2022.
[47] Ibid.
[48] Robert Dalsjö, Michael Jonsson & Johan Norberg (2022) A Brutal Examination: Russian Military Capability in Light of the Ukraine War, *Survival,* 64:3, 7-28, pg. 12
[49] Ibid, pg. 14
[50] Kasurak, Peter. *Canada's Mechanized Infantry: The Evolution of a Combat Arm, 1920-2012*. Vancouver, British Columbia: UBC Press, 2020. pg. 151
[51] Ibid.
[52] Ibid, pg. 152
[53] Ibid, pg. 153
[54] Ibid.
[55] Ibid, pg. 154

required by the Canadian Army – mechanized infantry."[56] National Defence Headquarters at the time was not convinced, believing this to be a "Cadillac" option, and that it was UN operations that "gave the government diplomatic leverage."[57] When the Cold War concluded, the Canadian Forces concluded that the Army required lightly armoured vehicles that would be "tailored to reflect the spectrum of mid-level operations."[58] Such deductions were based on the realities of the time and funding, but one could argue were based on assumptions that conventional warfare was a thing of the past, or that Canada would not deploy on a combat mission within the lifespan of such equipment. This would not be the case.

When the LAVIII was fielded in the early 2000s it addressed some of the concerns of the Infantry Corps with regards to firepower, however, field trials at the time noted that a wheeled vehicle had limitations the M113 did not. In Gagetown in 2001 "trails found problems with both protection and mobility."[59] While wheels provided faster movement on roads, in tactical situations the LAVIII had much less mobility than tracked APCs and in one example a "road-bound LAV platoon had been ambushed and destroyed in fifteen seconds by BMPs that had maneuverer cross-country at night."[60] While the LAVIII would perform better than many pundits expected in Afghanistan, it was during the assault on prepared enemy positions during Operation Medusa that commanders such as Lieutenant-Colonel Lavoie noted that "it was from this operation that the clear requirement for heavy armour in Afghanistan was born."[61] At the time the Army concluded "that a heavy IFV was required," which led to the now cancelled Close Combat Vehicle (CCV) program.[62] Therefore, the Army was not blind to this requirement, but has been forced to side-line such requirements due to funding and culture, only admitting the necessity of such equipment during the very moments their utility is evident.

The debate regarding mechanization and mobility has not been limited to the Infantry or Armoured Corps by any means, as the debate regarding self-propelled versus towed artillery is as equally important, if not more so. In 1983 The Directorate of Land Operational Research noted that "Artillery targets normally present a halted, exposed and softer target," than other combat arms elements.[63] During Exercise Bronze Talon it was demonstrated that on a modern, mechanized battlefield artillery can expect to be engaged or moving over 80% of the time.[64] It was determined that digging in towed guns for sustained fires was not realistic anymore and that "survivability must be pursued with vigour to ensure gunners lead a relative longer life than current research war game results promise gun crews of towed equipment."[65] A lot has changed since 1983, and the M777 was suited to Afghanistan, however, as we see today, warfare such as in Ukraine demands artillery that is as mobile as during the Cold War. Canada now finds itself facing hostile state actors without any form of mechanized or mobile artillery, relying solely on

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[56] Ibid, pg. 156
[57] Ibid, pg. 159
[58] Ibid, pg. 183
[59] Ibid, pg. 189
[60] Ibid.
[61] Ibid, pg. 194
[62] Ibid, pg. 194
[63] Sawatzki, G. H. and Canada. Dept. of National Defence. Operational Research and Analysis Establishment. *The Soviet Artillery Threat*. Ottawa: Dept. of National Defence, Operational Research and Analyssis Establishment, 1983. pg, 17
[64] Ibid.
[65] Ibid.

light, towed, and arguably vulnerable artillery that, despite their use in the Russo-Ukraine War, was designed for lower intensity conflict.

There are other reasons tracked vehicles are effective, outside of combat and for reasons that are not specific to any particular branch. The premise that the wheeled vehicle is somehow more efficient or better in any situation short of combat than a tracked vehicle is an argument that is not as black and white as it first appears. A US Army Engineer study entitled *Tracks versus Wheels in Soft Soil and Snow* proposed that while wheeled vehicles are unquestionably more efficient when moving administratively, in a tactical off-road situation wheel slippage and the requirement to move around rough terrain greatly reduces that efficiency.[66] Tracked vehicles also provide a much more comfortable ride for their crew, and are able to travel off-road much faster than their wheeled counterpart, which has numerous benefits.[67] In terms of general mobility off-road, unsurprisingly the US Army Engineers determined that tracked vehicles "can operate on softer soil, pull heavier loads and climb steeper slopes than wheeled vehicles."[68] These benefits are possibly exacerbated by the fact that the LAV 6.0 can hardly be considered a light vehicle, weighing in at over 28 tons with add on armour.[69] At such a size, it's as if the LAV 6.0. combines the weight of a heavy IFV with the mobility issues of a light wheeled vehicle. In a nation such as Canada, even domestic operations require incredibly mobile vehicles.

Unlike the armies of our Scandinavian contemporaries, Canada has not addressed its ability to operate mechanized forces in the Northern region of our own nation. There is good reason, from ground pressure to resistance that tracks are ubiquitous on over the snow vehicles.

***Figure 3 - CV90s in the snow. Credit: BAE Systems***

[66] Freitab, Dean R., Zoltan J. Janosi, and Army Engineer Waterways Experiment Station Vicksburg MS. *Tracks Versus Wheels in Soft Soil and Snow.* 1964. pg. 6
[67] Ibid, pg. 7
[68] Ibid, pg. 22
[69] Light Armoured Vehicle (LAV 6.0), Canadian Army, Government of Canada. <https://www.canada.ca/en/army/services/equipment/vehicles/light-armoured-vehicle-upgrade.html>

Most wheeled light tactical vehicles, as noted by the US Marine Corps Amphibious Test Branch, are "restricted to established roads and hard-packed snow, which typically requires some form of engineering support to establish or maintain."[70] The Swedish CV-90 IFV was conceived with such considerations in mind, with its Armadillo variant producing less ground pressure than a wheeled equivalent, despite being a heavy vehicle capable of carrying up to 16 tons of payload.[71] Canada has no equivalent capability, and is essentially restricted to using Light Over the Snow Vehicles (ie; Snow Mobiles) for ground operations in our own North, despite continual government rhetoric regarding Arctic sovereignty over the years.

## THE SOLUTION

One solution to this issue would be to procure enough heavy, tracked, mechanized forces to equip at least a single CMBG so that it may function as a cohesive all arms fighting force, much like has been done in the UK. The Canadian Army should also shift the narrative towards accurate and considered language regarding mechanized forces in order to set the conditions where Canadian Army Officers, those in procurement, and those advising government, can speak to the reality of what is required by a modern, NATO, Five Eyes military. Canadian Army rhetoric persistently espouses middle weight forces as almost superior to heavier forces, which has not enabled an honest assessment of what would be required to face our most dangerous adversaries. Our fleet of IFVs has become entirely wheeled (although they are very heavy), we are about to lose tracked support vehicles within the Royal Canadian Armour Corps, and the CCV project has been cancelled despite the relative success of all other Afghanistan related equipment purchases. The rationale here was that the LAVIII could be upgraded to perform the same role as the CCV, ignoring the fact that mobility literally begins from the ground up and the

[70] Davis, Justin D. "Over-the-Snow Mobility." *Marine Corps Gazette 104*, no. 1 (01, 2020): 57-60. <https://login.cfc.idm.oclc.org/login?qurl=https%3A%2F%2Fwww.proquest.com%2Ftrade-journals%2Fover-snow-mobility%2Fdocview%2F2362918001%2Fse-2%3Faccountid%3D9867.>

[71] CV90 Armadillo, BAE Systems < https://www.baesystems.com/en/product/cv90-armadillo--multirole-flexibility>

reasons behind the CCV project arguably remain extant.[72] At the time Retired Lieutenant General Andrew Leslie noted that the CCV was required not only for a symmetric war, but would be an "essential capability" facing an asymmetric threat as violent as that faced in Afghanistan.[73] Without an institutional dedication to mobile firepower, the CCV was dropped without much fuss, despite most of our allies realizing they require tracked APC's now more than ever. In fact, the Australian MoD has stated quite blatantly that "Defence's preference is for a tracked vehicle with a manned turret," with 450 such vehicles now on order. If similarly sized, non-NATO committed Australia can procure 450 tracked APCs, it is not nonsensical for Canada to at least admit their necessity, and move procurement in that direction.[74]

If the appetite could be acquired, the Canadian Army should focus on three key areas. The first would be the acquisition of mechanized Artillery. As noted previously, Canada no longer has a mechanized artillery capability and the Royal Regiment of Canadian Artillery is already short on guns. If the dearth in artillery is to be corrected, it should be with mechanized artillery, not more towed guns. Multiple Launch Rocket Systems would be a welcome addition; however, they are more appropriate as General Support Artillery. For Direct Support Artillery, the Brigades should firstly be equipped with self-propelled howitzers. Secondly, the CCV program should be reconsidered. Canada does not have enough tanks to equip all three CMBGs, therefore at this juncture, replacing the LAV6.0 outright would be unadvisable, and likely impossible. That said, equipping 1 CMBG with a CCV type vehicle would make sense, and provide the Army with a fully mechanized Brigade capable of operating in high intensity combat, while leaving the two other Brigades for mid-intensity combat and more rapid Strategic deployment. Finally, our total lack of tactical ground mobility in the North cannot be ignored. The BV206 must be replaced with a similar capability, and procuring the CV90 or similar

***Figure 4 - 2S7 Self Propelled Gun in Ukraine. Credit: Forbes***

[72] Miller, Stephen W. "The Canadian Army Fleet." *Military Technology 43*, no. 6 (2019): 12.
[73] Ibid.
[74] Land Combat Vehicle System (Infantry Fighting Vehicle). Department of Defence, Australia. <https://www.defence.gov.au/project/land-combat-vehicle-system-infantry-fighting-vehicle>

vehicle would give the Army the capability of projecting at least some kinetic power in an Arctic environment. There is a risk, given the rise in state competition that the Canadian Army could arrive on a future field of battle unprepared to face a formed, near peer or peer force, with little direct support from allies who will have their own soldiers to look after and protect.

## CONCLUSION

Predicting the future of warfare is notoriously difficult, but the current state of the world provides some indication that state on state warfare is not yet relegated to the past. The fact that the first few years in Afghanistan made it obvious that we were employing equipment that was not capable of dealing with a truly violent adversary does not provide much reassurance that the same would not happen again.[75] The concept that a light force (with vehicles that are not that 'light') is more strategically mobile also assumes that Canada has the means to rapidly deploy such forces with sufficient concentration to make them relevant, which may not be the case. We have no sea-lift capability, and the C-17 can deploy heavy tracked vehicles about as easily as it can deploy the LAV 6.0.[76] The idea of a light 'agile' force is also predicated on fighting an adversary that is not willing to sustain long term combat. Following the Franco-Prussian War George Chesney predicted that the future of war, based on the German Wars of Unification, would be wars fought with lightning speed, where strategic victory would be achieved by bold, rapid manoeuvre.[77] The Great War would prove him wrong, however, Chesney probably made the most logical deduction one could come to with contemporary evidence. The current situation in the Ukraine, so poorly predicted by the West, demonstrates that our long-held assumptions that symmetrical wars would be a thing of the past may not be wrong in a general sense, but it is wrong at the moment. An army of towed guns, few tracked vehicles and wheeled APCs that weight over 20 tons is probably not ideally suited for either rapid deployment, or combat.

The general evolution of armour vehicles over time has been towards heavier, more capable, more mobile, more powerful platforms, with the 'best' versions of such vehicles being tracked. Tanks are still in demand in warfare, evidenced by Canada's donation of Leopard tanks to Ukraine and tanks must be accompanied by similarly mechanized forces if they are to be effective. If we were to fight a land battle with a peer force we would need to remain mobile in any terrain, under combat conditions, for extended periods of time. Our infantry must be able to keep pace with our tanks and they must not be relegated to movement by road. Artillery may have to conduct fire missions and move very quickly if they are to avoid counter battery fire and doing so with towed guns may not be ideal. Our logistics chains must also have at least some capabilities to operate off road, especially within our A Echelons. Outside of this symmetric example, we need to be able to operate in the arctic, which very few of our vehicles are capable of. As a contribution Army, we must first and foremost be able to generate at least one formation that is heavily mechanized, largely track based, supported by mobile, protected

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[75] Koring, Paul. "US warned Canadians not to use flimsy Jeeps." *The Globe and Mail.* 4 October 2003. <https://www.theglobeandmail.com/news/national/us-warned-canadians-not-to-use-flimsy-jeeps/article1166951/>

[76] Jones, Mae. "First tank sent by Canada for Ukrainian forces arrives in Poland." *CBC News.* 6 February 2023 <https://www.ctvnews.ca/canada/first-tank-sent-by-canada-for-ukrainian-forces-arrives-in-poland-1.6261115>

[77] Freedman, Lawrence, Inc OverDrive, and OverDrive ebook. *The Future of War: A History*. 1st ed. New York: Public Affairs, 2017, pg. 24

artillery, and capable of operating alongside our allies in an unpredicted conflict.

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