

LUTZ UNTERSEHER

## MILITARY INTERVENTION AND COMMON SENSE

FOCUS ON LAND FORCES

WITH A FOREWORD BY CHARLES KNIGHT

> AND AN ESSAY BY CARL CONETTA

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in memory of Jonathan

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### FOREWORD

A commonplace observation is that most modern militaries were forged in the Cold War period. Following on that observation there is often an assertion that they must change in response to a world now very different. Although many military establishments are fond of the notion of pursuing a "21<sup>st</sup> Century Military Transformation", the overall impression of the actual transformational programs is one of confusion. And there is good reason for confusion. In many cases the essential "What for?" question remains only partially answered. In other words, the answers to the questions of "For what purpose(s) do we maintain this military instrument?" and "For what are we 'transforming' it?" are incomplete.

Assuredly, there are many partial answers. As a leading exemplar, the Americans have adopted the Global War on Terror (GWOT) as their organizing concept, but then they stop well short of explaining how this notion rationalizes a \$600 billion budget and a modernization agenda that includes new generations of weapon platforms optimized for fighting large mechanized armies (which no known 'terrorist' even dreams of acquiring). Europeans by and large have a more skeptical view of "transformation", as reflected in the saying, "What we used to do by hand, we now do manually". Indeed, most "transformation" agendas end up dressing up inertia to look a little different for each year's budget debate.

This book by German military thinker Lutz Unterseher makes a major contribution to undoing the confusion for one class of increasingly likely 21<sup>st</sup> Century uses of military force – internationally sanctioned military intervention using greater force than traditional peacekeeping and less than "war fighting". In Lutz Unterseher's words these interventions employ "armed forces and (possibly) forceful measures that [are] sufficient to deal with and discourage military challenges, while not being of a character or magnitude that compromises the primacy of political conflict resolution".

The carefully delimited use of armed force in support of political conflict resolution is a critical concept. The recent experience of the Americans in Iraq illustrates perfectly how easily political conflict resolution is lost when a military force unsuitable to the mission attempts to use its power to transform a nation.

There is a wide variety of situations where these sorts of interventions are being proposed and in some cases pursued. The concepts and names for them vary widely and they include peace enforcement missions, humanitarian interventions, and stability operations. In the discourse of the US Pentagon and other national military establishments stability operations refer to a wide range of military activities that are not primarily directed at defeating an opposing army, but rather have intended influence on the local or regional political environment including reassurance of allies and the encouragement of faltering governments. Stability operations may seek to disrupt or interdict illegal activities, restore order, and enforce agreements.

The politics of this class of interventions remain problematic. There is no international consensus about who legitimates these interventions, nor international standards for multinational command and rules of engagement. And in the recent experience of actual interventions there is evidence that political authorities often do not respect the interests of ordinary soldiers, failing to provide them with protective equipment and failing to give them appropriate missions.

This book does not aspire to work through all those problems; through its focus on force composition and structure it does address many of them and its contribution in this regard is far from trivial. In the chapter on "Domesticating Military Interventions" the author provides a good overview of the territory and makes suggestions for meaningful solutions and reforms, including the logic of creating a standing UN force.

Lutz Unterseher specifies transformation and modernization of military forces that will optimize their contribution to peace and stability operations. He moves with ease from the level of principles to the level of structure and operational use. By doing so he takes us a long way toward understanding how armed forces can transform toward relevance to 21<sup>st</sup> Century challenges.

Perhaps the greatest contribution of this book is its support for the proposition that the political objectives of an intervention can not be achieved if the armed forces employed are not suitable to the mission. In place of the notion of transformation we should be thinking about "tailoring forces" to their mission. If the character of the armed forces is one optimized for war fighting, they will almost certainly find themselves mired in war rather than succeeding in managing and resolving conflict. There is no better illustration of this than what has happened over the last four years to the powerful American army in Iraq. It is through this book's discussion of the particulars of armed forces that the truth of this proposition is made clear.

Modern militaries have land, sea, and air components. This book focuses on the land component as most relevant to the peace/stability mission. Sea and air forces often play a role in these types of operations, but their role is primarily one of support to the land forces.

If we look at the present distribution of resources between land, sea, and air components of major powers military establishments we see patterns that do not fit contemporary requirements. Many nations, too often seeking status, follow the lead of the US in making heavy investments in air and sea power projection assets which then stand idle while their ground forces are kept small and relatively inflexible. It is likely that political authorities support this distribution in response to the vested interests of the air and naval services and the arms industries supporting them. In addition, having a modest-sized or structurally slow deploying ground force may make it easier to decline requests from the US that more troops be shipped out to operations in places like Afghanistan.

This book addresses different combat elements of an army: infantry, armor, artillery, and helicopters. There are also discussions on the principles of designing forces for military interventions and on the pros and cons of wheeled versus tracked vehicles for combat missions.

In light of the renewed interest in "getting boots on the ground" for stability operations, infantry has regained a measure of its former status that it had lost to armored forces in the late 20<sup>th</sup> Century. Lutz Unterseher points out that not only is a different mix of ground forces required in the 21<sup>st</sup> Century, but that the type of operations contemplated demand high quality soldiers who are in short supply as volunteers in prosperous advanced economies.

Regarding armor Lutz Unterseher argues that an element of heavy armor will still be necessary especially for troop protection in patrolling crisis-prone areas where light/medium weight vehicles can not provide sufficient protection against mines, improvised explosive devices, and grenade launchers employed at short range. Instead of the all medium weight force, currently favored by the US Army, he argues for a mix of light agile patrol vehicles teamed with a much smaller number of heavy gun and personnel vehicles for infrequent assaults, evacuation under fire, and reinforcement of lighter elements.

Lutz Unterseher looks favorably on high-precision artillery as a means to add quick reaction fire power to otherwise lightly armed infantry forces. He argues that the use of artillery in skilled hands can be considerably less provocative (a very important consideration in peace operations) than inserting tanks into problem areas with plenty of civilians about. Artillery fire can also be allocated and employed much quicker.

The controversial issue of whether new generations of army vehicles should ride on wheels or tracks is examined in some detail. The advantages and drawbacks of each sort of vehicle in regards to operational and tactical mobility, active and passive protection, firepower, and costs is considered for different weight, function, and armor classes. Lutz Unterseher then relates these findings to the functions and composition of future intervention forces, concluding that the optimized force would be a mixture of light and medium weight forces riding largely on wheeled vehicles with heavier forces on tracks.

Regarding the air arm of modern armies, the helicopter, Lutz Unterseher acknowledges its success as "a special effects star" in the role of a political and military symbol – plucking a downed pilot or disaster victim from danger, providing a noisy and dramatic entrance for a dignitary, or as a fast moving assault vehicle with guns blazing in a war movie. But when we examine the helicopter's record of operational usefulness in combat, the picture is decidedly mixed. Helicopters remain expensive and vulnerable. They have many uses in auxiliary roles, but Lutz Unterseher is skeptical of their value in mass formations, especially in the context of "peace operations".

Carl Conetta's contribution on the military use of rotocraft complements and differentiates Unterseher's critical view. It adds a lot of recent relevant evidence and considerably advances the discourse.

The structures of armed forces tend to change over time. Sometimes those changes are the result of strategic intention and planning. Perhaps too often those changes are unintentional. A reader of this book should come away with a good appreciation of how change to force structures will affect the relevance and effectiveness of armed forces for the resolution of political conflicts in the 21<sup>st</sup> Century.

The essays in this book were written over the course of the last nine years, and most were published by the Project on Defense Alternatives at the Commonwealth Institute in Cambridge, Massachusetts. They remain very relevant and fresh to present attempts at defense planning because of their high quality of analysis and because so little has changed in the composition and structure of the militaries in the recent period.

> Charles Knight Cambridge, MA, September 2008

# THOUGHTS ON THE EVOLUTION OF INFANTRY: PAST, PRESENT, FUTURE

## 1 Reminiscences and observations

#### 1.1An anecdote

During the Seven Years War a young, handsome and daring cavalryman in the Prussian Army was observed taking sexual liberties with his beautiful mare. This indiscretion was brought to the attention of King Frederic II. Advisors fretted as to what would become of the army as a fighting force, and of war in general, if such behavior were to spread across all ranks of mounted personnel. Many expected the king would have this deed punished in the most draconian manner. Frederic decided otherwise and simply ordered: *"Transfer that chap to the infantry!"* This royal order can only be fully appreciated if some background information is taken into account, as follows:

- The king was very fond of young and handsome men.
- During the Seven Years War good soldiers were an increasingly scarce commodity, especially in Prussia, and had to be carefully conserved for battle.
- ~ Cavalry enjoyed a much higher status than infantry.

## 1.2 Cavalry and infantry

The fact that the status of cavalry was considerably higher than that of foot soldiers did not reflect the respective fighting values of the two arms. Even in Frederic's times, it was a common viewpoint that the infantry formed the backbone of armies, was essential for winning military encounters and could be justly called the 'queen of the battle-field'. Cavalry, on the other hand, was seen as an arm best suited for reconnaissance, pursuit and 'screening' functions: cover for offensive or retrograde actions. And it was hoped that – with concentrated, well-timed *arme-blanche* (shock) attacks – in certain circumstances it could tip the balance of forces (something which, in reality, occurred infrequent-ly).

But no matter how one rated the military function of cavalry, its status derived principally from the superior reputation of its personnel. As in the case of the infantry, practically all commissioned officers in the cavalry were recruited among the landed gentry. But, whereas ordinary infantrymen came from all walks of life, many cavalrymen had thorough riding experience prior to their entry into the forces and often enjoyed a personal relationship with their noble superiors. Cavalry was quite elitist and regarded more reliable than other force elements. In Frederic's days, this meant that cavalry units were not only employed for military tasks proper, but also for 'shepherding' their comrades in the infantry. Especially when infantry formations were marched through covered terrain, forests for example, they had to be escorted by trustworthy cavalry. Otherwise quite a few infantrymen, most of whom had been – one way or the other – pressed into the forces, would have vanished into the underbrush.

Despite the fact that the infantry had rather humble origins, its status rose steadily. During the 19th century two developments mainly contributed to this trend:

- ~ The increasing firepower of the infantry (and artillery) substantially reduced the cavalry's chances for survival on the battlefield.
- The masses of infantry in the much enlarged armies of that era were more frequently recruited on the basis of conscription: an institution then enjoying broad public support.

In the Great War (1914-18), when cavalry forces nearly vanished from the fire-swept battlefields in France and Italy, the infantry seemed to have won the status contest once and for all. Yet, ironically, at the very moment of victory a new element appeared on the scene: armored and mechanized forces whose roles were seen as cavalry-like and which, in their early days, relied substantially for recruitment on former cavalry officers.

#### 1.3 Different kinds of infantry

'Infantry' stands for the arm whose combat soldiers are trained and prepared to fight on foot: exclusively, mostly or when the situation requires. (There was once a special kind of light cavalry, dragoons, whose soldiers were also trained to fight dismounted in certain circumstances. But their days are over.) With the notable exception of mountain infantry, a term referring to the terrain of operations, modern infantry forces are characterized by the means of allocation: naval, airborne, heliborne, armored (or heavy mechanized), light mechanized or motorized.

In addition there are Special Operations Forces (SOF) whose ground-fighting component is normally considered a kind of infantry as well – one with a decidedly elitist image. In this case it is assumed that neither the terrain of operations, nor the means of transport is appropriate for characterization: In other words, SOF are believed to be a kind of ubiquitous Jacks-of-all-trades.

In the new age of military interventionism the infantry has experienced a veritable renaissance and has come more to center-stage than ever before in modern times. Heavily armored elements, which in the realm of conventional ground forces had been the mainstay of the East-West confrontation, have lost quite a bit of their importance. Now the emphasis is placed on 'lightness', entailing strategic (transcontinental) and operational (in-theater) mobility. In addition it is hoped that "lightness" will contribute to tactical agility. Generating relatively more and better infantry – along with some light (infantry-like) mechanized cavalry – has been a preferred solution to the new intervention requirements.

In news reports on contemporary military interventions, and there are plenty, infantry and infantry-like forces are mentioned quite often. But references to 'ordinary' – mechanized or motorized – infantry are scarce. As if infantry, as such, still has a relatively low status, reports about its actions and accomplishments tend to include attributes that render the forces in question an aspect of being 'outstanding'.

No problem if the subject of the respective report is a unit of SOF or 'Recce Marines' proper. But if no such qualification fits, there is quick resort to 'crack', 'elite', 'highly professional' and other similar attributes. The message conveyed to the public is that ordinary soldiers are not up to the challenge and that modern intervention scenarios require the toughest, the smartest and probably also the most aggressive.

## 1.4 Elite and other forces

The suggestion that only the very best and most daring can do the job leads to the question of how many, narrowly defined, elite infantry or infantry-like forces there are, and how these roughly relate to the demand of relevant scenarios. Let us, in this context, examine the cases of the USA and Germany: the former being the world's prime interventionist, whereas, in this respect, the latter can be regarded a middle-ofthe-roader.

The SOF of the United States currently (2006) comprise about 37,000 active soldiers. According to the recent Quadrennial Defense Review this force size is to be augmented to about 46,000 by 2010. This means that the US has, and continues to have, by far the world's largest Special Operations Forces. Their size is, in part, a result of indigenous factors, above all the status-seeking 'arms race' between Army, Navy/Marines and Air Force. And their projected growth appears to be mostly a response to perceived challenges: in particular, the need to fight insurgency.

It is somewhat sobering to learn, however, that the "teeth" component of the US SOF, namely the boots on the ground, has been estimated to number less than 6,000 soldiers – to be increased to less than 7,000 by 2010. It almost goes without saying that fighting insurgency in two separate theaters, Afghanistan and Iraq (and possibly also a third contingency?) requires many more fighters: leaving a vast number of tasks to somewhat lesser elite-prone infantry, such as air- and heliborne, but even more to 'ordinary' troops.

By contrast Germany has much smaller SOF. They number about

1,000 soldiers who all belong to the Army ('Kommando Spezialkräfte' – KSK). 400 of these can, at the most, be considered ground fighters (which implies a teeth-to-tail ratio better than in the US). The Federal German Forces have found it rather difficult to attract enough personnel for this formation, although there are extra pay and other incentives. If one were to translate these recruiting difficulties into the American situation, taking into account the difference in population, the result would see the US forces facing serious problems having at any given time more than 1,500 frontline SOF fighters. But in reality they have managed to reach a complement nearly four times as strong.

How can we understand this? The population of the United States is, on average, younger than that of Germany. In the US the incentives for outstanding personnel appear to be higher, and the military has a somewhat better image. But does this sufficiently explain the recruiting gap? Probably not! A complementary explanation would be that in the United States the standards of admission to the Special Operations Forces are lower than in Germany. Perhaps as a result of that 'arms race' between the services in which not just quality, but also quantity, matters.

Even if the 'elite' is not what it claims to be, it lacks the quantity sufficient to meet the challenge of modern intervention scenarios. There is no way around relying more on ordinary infantry which, of course, also implies that such forces have to be rendered fit for their very complex tasks. In other words, our focus should be less on the selective recruitment of the acme of youngsters, and rather more on a conceptual framework that helps turning even average young people into soldiers who can successfully contribute to a variety of taxing missions.

## 2 Digression: the Jäger concept

## 2.1 Baroque origins

In 1740, when Frederic II had just come to the throne, the Prussian Army was given a 'Jägercorps', with only a few battalions, to be recruited among forest wardens and skilled hunters (Jäger = hunter) who were or had been servants of territorial princes and other noble owners of

estates with large areas of non-cultivated, mostly wooded land. These recruits typically excelled in physical fitness, were good marksmen and could survive on their own in the wilderness.

When in the army, they were issued rifles (mostly double-barreled ones for increased firepower) which were significantly more accurate than the muskets given to ordinary line infantry. They trained for selective well-aimed fire rather than for volley fire. Their uniforms were less pompous than the ones sported by their comrades in the line, and – as an early attempt at camouflage – had a greenish color. Units of the *Jägercorps*, also known as light infantry, were employed for missions such as testing an adversary's strength through skirmishing, luring isolated enemy detachments into ambushes, hit-and-run attacks on outposts, and – in cooperation with cavalry – foraging and reconnaissance.

One and three quarters of a century later, at the outset of the Great War, the Prussian Army had 14 Jäger battalions; the Saxonian and Bavarian Armies two each. During that war quite a few German infantry divisions included Jäger regiments, each consisting of three battalions, and there also was one Jäger division. Of course, such a considerable growth implied that the original pattern of recruitment had to be abandoned. Personnel had to be drawn from other walks of life. But what remained was what might be called a 'Jäger spirit' along with a particular style of training and fighting: very much stressing fluid rather than positional warfare, decentralization, delegation of authority and scope for initiative.

## 2.2 Finnish example

In 1914 Finland was still a part of the Czarist Empire. When the war broke out, the Finnish movement for national independence saw this as a chance. A defeat of Russia, they expected, would necessarily result in the liberation of their fatherland. Hundreds of young people, among them many students, managed to escape from being coerced into the Russian forces: either by running away from home or, if they had left Russia before the war, by staying abroad. Most of them intended to join the German Army, or more precisely, establish with German help, a military formation of their own that could contribute to the enemy's defeat and eventually to Finnish independence. Such aspirations converged with German ideas to create a military instrument that could be helpful in causing disarray and unrest in Finland, an important part of Russia's rear, or even bring about the collapse of the enemy's control there.

As a consequence, in the summer of 1915, the "Finnish Legion" was founded and headquartered in Northern Germany. Soon after, it became a typical - yet reinforced - Jäger battalion (Jägerbataillon 27) of the Prussian Army. Its German staff and drill personnel were drawn from experienced units of Jäger- as well as combat-engineer units. After less than a year the formation numbered 1,500 men. The strong battalion was equipped with captured Russian weapons and trained for fighting - guerrilla/commando-style - behind Russian lines, especially in Finland. But as the battalion's insertion into Russia's rear appeared to be extremely difficult, the German High Command, in 1916, decided to employ it in positional (trench) warfare, at the eastern front. The Finnish legionnaires profoundly disliked this, as they had dreamed of operating on home territory, but nevertheless fought quite successfully. Obviously, a formation trained - Jäger-style - for guerrilla action could adequately cope with the challenges of trench warfare. It seems less likely that this can be expected in the reverse case.

Somewhat over a year later, the Finnish Legion finally got its chance. After the ouster of the Czarist regime, in February 1917, it was released from its duty along the eastern front and removed from the Prussian order of battle. And as civil war broke out in Finland, with the Russian government rapidly losing control there, it went home – leaving its German staff behind. From the summer of 1917 onwards it formed the core of the new 'White' (bourgeois) Army and played a key role in driving the Bolsheviks out of the country: a precondition of making Finland an independent, modern nation state.

Because of both its military excellence and its value as a political symbol, the Legion soon became legendary. In this context the Finns speak of the 'Jäger Movement' (*Jääkäriliike*). The spirit and concept of Jäger-style warfare have been vital in shaping Finland's infantry in general. Without this particular background the astounding successes of the Finnish forces in their defense against the Soviet onslaught, 1939-40,

cannot be understood.

Certainly there was much individual toughness and heroism stemming from the fact that the Finnish fighters defended home territory. More important for their performance, however, were ingenious tactics that envisaged hit-and-run action as well as the trapping, isolation and quick destruction of astray enemy units. Much emphasis was placed on the agility and organizational flexibility of sub-units. Small teams could be broken down into two functional elements: one for holding and masking, the other one for flanking attacks. This differed from established practice in most other armies that, at the lower levels of organization, required that everyone perform the same tactical action at the same time. Only with such innovations was it possible to at least partly compensate for a grotesque imbalance in men and materiel between the Finns and the Soviets.

## 2.3 Contemporary relevance

The Finnish Army continues to adhere to the Jäger concept. This also applies to the training of troops that have out-of-area operations among their primary missions. In this context the Jäger orientation appears to have spread all across Scandinavia (as Finland and other Scandinavian countries have formed joint intervention forces). Also in Central Europe the concept is alive and well. In Austria, for instance, a country with a long tradition in peacekeeping and peace support, the training of all infantry has been – to a considerable extent – influenced by the 'Jäger spirit'. In addition there has been the creation of special infantry units for guerrilla-style warfare (*Jagdkommandos*). Interestingly, even these Austrian high-quality formations, as with similar ones in Finland and other Scandinavian countries, have been recruited on the basis of conscription.

In yet another conscript army, that of Germany, the 'Jäger spirit' is relevant as well (which is no surprise given the historical roots of the 'Jäger' and the current feeling that military interventions require light and particularly flexible forces). The problem appears to be, however, that the German Army at the same time intends to exhibit some heavier and high-tech elements, 'Panzergrenadiere' (armored infantry), for very intensive operations (of re-conquest, for instance) that in the military leaders' minds still promise more international status than ordinary infantry.

## 3 Challenges to modern infantry

## 3.1 Invading and defeating a hostile country

Let us take the case of a nation state, whose government is in reasonable control of its territory, being militarily assaulted! (Hopefully this is to be achieved by an international coalition, not by a lone hegemon; this group of countries enjoying full legitimation by the United Nations). Since it can be expected that the country to be invaded belongs to the Third World, there is a very low probability of large-scale encounters between massive armor forces of comparable capabilities. As in the Anglo-American assault on Iraq, high-tech armor plus armored infantry, in conjunction with close-air support, could be employed – spearhead fashion – to overrun a technologically inferior foe who may wish to pay back in the same currency, but can't.

But if the aim of the whole operation is to manifestly assume, not just military, but also political control of the country in question, there remains a lot of work to do for all other kinds of infantry. Apart from various types of mopping-up jobs, there is the key task of taking towns and cities: the latter often being of particular political importance. With this in mind, it should be noted that the swift seizure of major cities in the war against Saddam Hussein cannot be regarded as normally expectable or easily repeatable.

The situation in Iraq was quite unique: with an enemy initially being "co-operative" rather than resistant, and with wide, pompous alleys cum squares, which the Baath Regime had cut into medieval quarters, providing ideal avenues of access. It may well be that future contingencies require more traditional measures of offensive urban warfare: namely systematic, step-by-step operations in which heavy elements, but also new cutting-edge, high-tech gadgets (such as robots) would play a relatively limited role.

Since such operations need a lot of manpower, Special Operations

Forces, no matter how good their quality, cannot be considered centerstage. They, along with other elements of specialized infantry, such as airborne or mountain troops, would have to leave the bulk of the operations to ordinary light infantry. But this infantry should not be 'light' in the sense that it is, say, standard American line infantry simply lacking some items of heavier equipment. On the contrary, its lightness should be founded on doctrine and training. A country or coalition incapable of achieving this should not embark on policies of military intervention in the first place.

## 3.2 Subduing resistance and guarding the peace

Subduing tough resistance applies to two kinds of problems: Controlling the aftermath of a war against a functioning state; and the case of intervention into a civil war which has developed in a 'failed state'. In both cases key demands on the military are as follows:

- ~ Continuous control of wide areas;
- ~ Maintaining a non-provocative presence on the ground;
- ~ Frequent and rapid shifts in the focus of attention;
- Flexible isolation and containment of pockets of resistance;
- Concentrated force to take strongholds with minimal collateral damage;
- Capacity to answer certain provocations with calculated counterescalation.

These demands do not leave much scope for air and air assault operations: such operations tend to be highly provocative, often possess overkill qualities and do not signify that the intervening force intends to have a persistent grip on the region in question. A mix of high-quality armor, commando-type infantry and light mechanized forces with Jäger-style training and orientation are better suited to the demands of subduing resistance and guarding the peace.

The components of armor and commando-type infantry can be relatively small: to be used in taking strongholds and in well-focused counter-escalation. The bulk of the forces for wide area control and demonstrative, but non-provocative presence on the ground (recent experience suggests a generous dosage) should consist of light, mechanized contingents. These would be operationally highly mobile and enjoy sufficient crew protection (no makeshift solutions such as the HUMMER with add-on armor.)

Troops would move in relatively small units: capable of acting on their own within a well-understood general frame of reference. If dismounted they could deal flexibly with minor incidents. And if a stronghold were to be contained, they could be rushed there from different directions combining their dismounted strength in a defensive manner.

If the tasks of containing and reducing resistance have been successfully solved, missions of peace support and peacekeeping get their chance. In these contingencies, which apply when and only when there is substantial control of a crisis region or an accord between formerly conflicting parties, the demands on the military are rather modest. If the task is peace support, which means that there is still some possibility of armed resistance flaring up, one may choose the same force components that are needed for subduing tough resistance: however with much less emphasis on heavy armor and Special Operations Forces. And in the case of peacekeeping, armor and commandos are superfluous altogether.

#### 3.3 Human relations and adequate recruiting

In the context of *all the missions* discussed so far the aspect of human relations is of prime importance. Interventions on behalf of the international community will fail if they are accompanied by humiliation of the population in a crisis region; they must deliver security to persons and contribute to a sense of trust. Soldiers of an intervention force must be able to interact with the locals without arrogance. And they must take care with the culture and property of the locals. It is, for instance, extremely counterproductive, and a severe breach of international law, if soldiers from abroad turn a blind eye on looters and other criminals who try to exploit the opportunities between the demise of the old system and the establishment of a new order.

Unfortunately crack forces with an elitist touch have tended to

develop what might be called a 'particularly militarist' spirit – an orientation that too often runs counter to the requirement of avoiding provocation. For instance, in Kosovo US Marines painted "We are here to kill" on their armored vehicles. The question is whether or not more civilized behaviors can be expected from ordinary soldiers who constitute the bulk of infantry forces. At first glance it appears near-tautological that a person who is less 'militarized' should be able to show a more 'civilized' behavior. But the answer is not quite so simple.

If the majority of the occupation forces are not properly trained for their often taxing tasks, if they are only capable of following standard procedures in a rigid and schematic manner, they will sooner or later get frustrated and even scared by a lack of success and more dramatic mishaps. Frustration and fear do not constitute a good basis, however, for flexible and open attitudes towards the locals. Would a reorientation of the training concept, in the sense suggested in this analysis, produce a better solution? Not necessarily so!

It has been observed that the introduction of the Jäger concept, along with the creation of a congenial spirit, could turn nearly everyone into a reasonably good soldier. Yet this may only be true, if one stresses the word 'nearly'. Indeed, the quality of an army's 'personnel input' matters. The vast majority of the all-volunteer armies in the industrial West face a problem when it comes to attracting sufficient personnel. They have to compete with civilian employers for young people whose values are increasingly civilian. This is why, as a general tendency, the military gets personnel that – on average – is sub-standard. And this is also what may help explain two phenomena: namely the particular emphasis on elite elements in volunteer armies and the deficits in training of the bulk of the forces.

Only relatively few recruits are good enough to receive a more demanding training. Their particular qualities are then expected to compensate for the lack of performance among the more numerous others whose training – for reasons of poor personnel input – can only be schematic. This is a hopeless venture which in the end leads to a twotier army with grave problems of adjustment to modern intervention scenarios. In this respect an army would be better off that uses shortterm conscription to attract volunteers for longer-term careers, as conscription tends to bring into the forces better people than relying on the labor market.

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## Bibliography

Albrecht, N., ed.: *Der Alte Fritz in Anekdoten* (Munich: Buchendorfer, 2000).

Barth, O. and Sollfrank, H.: "Infanterie", in J. Gerber, Maj. Gen. Ret., and M. Kühr, Col., eds., *Landkriegführung: Operation Taktik, Logistik, Mittel* (Bissendorf: Biblio, 2004), pp 133-148.

Bolte, P.: "Infantry", in T. N. Dupuy, Col. Ret., ed., *International Military and Defense Encyclopedia* (Washington/New York: Brassey's, 1993), pp 1255-1259.

Glatz, R. L., Maj. Gen.: "Spezialisierte und Spezialstreitkräfte des Heeres", in Gerber/Kühr, op. cit., pp 289-300.

Jeschonnek, F. K.,: "Luftangriff / Luftlandeoperation / Luftlandetruppen", in Gerber/Kühr, op. cit., pp 221-134.

Keßelring, A.: "'Finnische Legion'. Die Jägerbewegung im ersten Weltkrieg", *Militärgeschichte*, 4/2004, pp 10-13.

Unterseher, L.: "Städtekampf", in Gerber/Kühr, op. cit., pp 321-328.

# A BRIEF HISTORY OF ARMORED AND MECHANIZED FORCES

#### 1 The landship: its peculiar origins

*In the beginning there was a box.* That is to say that the first experimental tank, built and tested in Britain 1915, had the clumsy shape of a simple, rectangular box. It was code-named "Little Willie".<sup>1</sup> The wartime series production models (Mark I-V), which were shipped to France in increasing numbers from 1916 onwards, were clumsy boxes too, but rhomboid and much bigger. (The prototype of Mark I, descendant of *Little Willie*, was called "mother".)

The early French developments, which appeared soon after, also sported a box-type look – yet without that rhomboid touch of their British counterparts. But toward the end of the Great War the French fielded a very compact tank (Renault M 17/18) with one revolving central turret, armed with a single gun capable of destroying other tanks.

This proved to be farsighted. In the long run the one-turret approach was generally adopted (though there were, in the inter-war years, a number of rather bizarre developments, sporting multiple turrets). More firepower could be handled more flexibly than in the case

<sup>&</sup>lt;sup>1</sup> "Little Willie" had a double connotation: it was the contemporary British tabloids' nickname for the German Crown Prince, and it also stood for a small penis. We have here an impressive example of that peculiar sense of humor cultivated in the British forces. And, by the way, "tank" itself is originally a code-word, as the first such machines to be sent to the French front had been camouflaged and marked "water tanks for Petrograd".

of the 'armored boxes' with their casemate-mounted weapons protruding from each flank.<sup>2</sup>

The tank was a planned invention.<sup>3</sup> The development of *Little Willie* can be considered a relatively quick reaction to the situation as it had evolved along the front line in Northern France since the stopping of the German strategic offensive ("Marne miracle") in September of 1914. The resulting stalemate had soon taken on the form of positional warfare characterized by opposing trench systems of increasing depth, with deluges of defensive fire generated mainly by machine guns and powerful field artillery.

To overcome this stalemate, to get 'war in motion' again and to drive the Germans back, the British – and likewise the French – resorted to a solution which appeared primarily technological: namely to the combination of tracks, armor and guns. Tracks, as copied from contemporary agricultural tractors, were intended to provide an off-road capability, and even more: a trench-crossing potential. The armor was – of course – seen as a means to at least partly neutralize hostile fire while on the move. And the weapons, machine guns and/or cannon, had the role of suppressing the other side's infantry cum forward artillery. That simple seemed to be the recipe for victory.

## 2 1914-18: technology lacking doctrine

Germany could have embarked on a policy to build considerable numbers of tanks too. Its technological standard and industrial base would have permitted such an option.<sup>4</sup> The production of tanks, which

<sup>&</sup>lt;sup>2</sup> The French innovation much resembled the design of a "motor gun", developed in 1911 by Gunter Burstyn, a first lieutenant in the Austro-Hungarian Army's railroad corps, who in 1912 unsuccessfully proposed it to the War Ministry in Vienna.

<sup>&</sup>lt;sup>3</sup> In the beginning of 1915 Winston Churchill, then First Lord of the Admiralty, founded – and illegally funded – the "Landships Committee", a body consisting of military and technological experts (mostly from the Royal Navy which had a stake in securing its bases in France). This committee managed to initiate the construction of *Little Willie* and to keep up the pro-tank momentum even after Churchill's political demise in the course of 1915.

<sup>&</sup>lt;sup>4</sup> Toward the end of the Great War the Imperial German Army fielded a very small

appeared to be a realistic possibility since the end of 1916, was given a relatively low priority, however. Instead the Imperial Army's plans for a major strategic breakthrough campaign in the West were based on the creation of huge artillery concentrations with improved equipment and more flexible tactics plus a new and revolutionary approach to infantry operations.

The infantry (cum elements of combat engineers) was trained to find the weak spots created in the enemy's defense by friendly fire, assault them in a concentrated manner to achieve a breakthrough which was then to be exploited ruthlessly, without particularly guarding one's own flanks while bypassing pockets of resistance. The opinion then being that deep thrusts would bring about quickly a collapse of the whole fabric of the opponent's defense, thereby removing potential threats against one's flanks and rear.

The offensive conducted by the Germans in the spring of 1918 failed – mainly for three reasons: problems with coordinating infantry action and artillery fire, unexpectedly coherent resistance especially by British troops, and a lack of resources resulting in the inability to appropriately 'feed' the assault when it had reached a certain depth.

In contrast to the German Army's preferred approach, the British and the French, as we know, believed to have found a more technological solution to the problem of deeply intruding (counter-)offensives. They considered that large tank forces<sup>5</sup> in themselves were the key to success and therefore did not invest much energy in devising special tactics and operational methods tailored to such forces.

Tanks were employed in a more or less traditional fashion – sometimes in large numbers, sometimes in small packages, but always in the style of contemporary, schematic infantry attacks: on a wide front, slowly advancing, while cautiously guarding one's flanks.

This way major breakthroughs were not achieved. Typically the

number (less than 20) of an indigenously developed tank. It had no revolving turret and was – by contemporary standards – rather heavy (30t, metric tons, like the British Mark V) and cumbersome. It made the impression of a box-shaped (sic!), mobile fortress. Based on the assumption that the war would go on, mass production, which also envisaged a medium-weight model, was planned for 1919. <sup>5</sup> During the Creat War Britain fielded over 2 000 tanks. France more than 1 000

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offensive ground to a halt rather soon, since it had given the opponent ample time to thicken up his defenses. Nevertheless: to stop a major tank assault required very substantial efforts on behalf of the defender. In other words, it had an attritional effect which in a less dramatic manner also contributed to the final – though delayed – success of the *Entente*.

Already during the Great War a few military experts<sup>6</sup> felt that the tank forces, as a new arm, needed, in order to develop their true talents, an adequate operational and tactical doctrine. Later, in the inter-war years, such thinking found increasingly more proponents in Britain, the USSR and especially in Germany. A translation of the approach into operational and organizational terms was not generally accomplished, however.

What was the essence of the new conceptual approach? Tanks were conceived of as the core and key agent of deep thrusts into enemy territory, as a means to bring quick victory costing much less in blood and materiel than previously. In order to meet this expectation the tank forces were to be trained and organized for massed concentrations against perceived weak spots, rapid breakthrough operations and deep thrusts without schematic flank protection, bypassing pockets of resistance. In other words, it seemed as if the German assault infantry of 1918 had provided the 'prophets of armor' with an inspiring frame of reference.

The more the armor debate evolved, a consensus among the proponents developed according to which far-reaching thrusts of tank forces could only be successful if they were covered by another new arm, namely tactical airpower, and that they should – for protection and as a kind of 'penetration aid' – enjoy the immediate support of artillery (to be rendered armored / more mobile) and of infantry preferably riding on the same basic platform as the tank crews.

Interestingly, in addition to their standard armament and crews the British Mark V tanks of 1918 could transport machine gun teams that were supposed to occupy territory freshly conquered by the armor in case ordinary, unprotected infantry had not been able to follow (which

<sup>&</sup>lt;sup>6</sup> Most of them served in the British Army, John Frederic Charles (JFC) Fuller holding the most advanced views.

often was the case). And there also appeared in 1918 a tracked, lightly armored infantry carrier (Mark IX) that could, in addition to its crew of 4, accommodate on board up to 50 soldiers: most certainly 'too many eggs in the basket'. Not surprisingly, this vehicle looked like a box too, a very big one indeed.

#### 3 The inter-war years: experimentation

The inter-war years present a multi-faceted and rather diffuse picture. Increasingly numerous prophets of armor as an arm in its own right made their case, but ran into a sometimes overwhelming opposition from traditionalists who regularly declared the demise of the tank, believing that advances in infantry anti-tank rifles and cannon would neutralize the advantages claimed for the mobile threat. All they would concede was that tanks might be distributed among infantry formations to serve as immediate 'breakthrough aids' and small-scale reinforcements (mobile anti-tank guns) in otherwise rather conventional structures.

To a considerable extent the latter position was characteristic of the French Army's orientation for nearly two decades. France had more tanks than any other power – except for the USSR. But over one third was given, battalion-wise, to infantry divisions (motorized or moving on foot). Some were assigned to the still existing divisions of horse cavalry – resulting in a tactically odd combination of very different levels of protection and mobility. Some served with very lightly protected "mechanized" divisions and quite a few remained in store.

As a result only about one sixth of all tanks were integrated into three armored divisions of which, at the beginning of the Wehrmacht's assault, just one<sup>7</sup> was ready for combat. This compares to the total number of French divisions which, on mobilization, were earmarked for the defense against Nazi Germany: namely 73.

Britain appeared to have chosen a different path of development, as already in the 1920s, with promising results, it experimented with

<sup>&</sup>lt;sup>7</sup> Commander: General Charles de Gaulle.

genuine armored formations of the higher tactical order. But owing to conservative resistance and resource problems affecting the British Army the expeditionary force deployed to France in 1939/40 did not comprise an armored division at all.

There were just a few infantry tanks plus light cavalry tanks armed only with machine guns. Britain had promised to send four regular divisions across the Channel, among them two armored divisions, yet in May 1940 the *1st Armoured Division*, the only such formation ready for use, was still in England.

In the Soviet Union, and somewhat later in Germany, experimentation with the new arm had a far more substantial effect. In the USSR a large number of genuine, large-scale armored formations were created, though learning deficits typical of the communist system impeded their proper use.

In Germany, where the principles of armored warfare appeared to be better understood, resource constraints and the short preparation time for war did not permit the creation of as many armored divisions as desired. But still there were 10 such formations ("Panzerdivisionen") – out of an active total of 77 committed to attack the Netherlands, Belgium and France.

Parallel to the experimentation at the doctrinal and organizational level there was in the field of armor development a broad spectrum of technological solutions – of types of tanks and other related vehicles. To give an impression: there were very heavy, slow-marching machines for an initial breakthrough along with somewhat faster, medium-weight tanks for the exploitation of such achievement, in other words: for longer-range missions.

Also quite popular: wheeled armored vehicles (some with more than 4 wheels) and light tracked ones for reconnaissance and cavalry functions. And there appeared among some armies' armored equipment very small tracked carriers mainly for logistical purposes – platforms which in their configuration as "midget tanks" served with infantry formations at the lower tactical level as 'mobile, protected machine gun nests'.

'Mechanizing' the artillery, giving it more mobility and (some) armor protection, as suggested by many advocates of armored warfare, did not happen. Simple motorization by employing unprotected tractors seemed to suffice. And motorization was also the fate of a gradually increasing number of infantry formations.

Only relatively few were mechanized, which normally implied putting them on lightly armored half- or three-quarter track vehicles. Such formations, especially in the German Army, were in the context of armored divisions closely linked to veritable tanks: an odd combination, as we shall see. Apparently, the sound idea of putting the infantry riding and cooperating directly with tanks on tank-like platforms had not been taken seriously.

### 4 1939-45: winning by armored thrust

After the Nazi victories over Poland in September of 1939 and France in May/June of 1940 powerful armored thrusts for 'deep maneuver', based on massed tank formations, became throughout World War II the generally accepted recipe for successful strategic offensives or counteroffensives.<sup>8</sup> But there were caveats.

The longer the war lasted, the more it became clear that armored thrusts without own air superiority in the area of concern were utterly futile undertakings. Furthermore, the proponents of offensive armored warfare increasingly had to reckon with advances in their opponents' defensive arrangements.

As demonstrated by the British at *Alam Halfa* (1942), the Soviets at *Kursk* (1943) and to some extent by the Germans at the *Seelow Heights* (1945), tank-heavy offensives could run into very serious trouble if the defender had created an in-depth array of infantry/anti-tank strong-holds, making good use of natural and artificial obstacles (such as minefields), with armored (and artillery) reserves nearby that would act as troubleshooters – in a determined and concentrated manner.

At the level of technology the test provided by the war with its many fierce encounters served as an agent of rationalization. The midget tank disappeared at once, and soon the heavy, slow-marching

<sup>&</sup>lt;sup>8</sup> This applies only to the European theater, however. In the Far East, where the war consisted of a series of amphibious operations and infantry encounters in broken terrain, the tank appeared to be far less important.

infantry tank for initial breakthrough operations became obsolete. It was felt that one type of standard tank should be able to accomplish both: overcome the immediate defenses *and* travel deep.

But within a short period of time, especially in the armies of Germany and the Soviet Union, this concept underwent notable differentiation. The standard tank came in two classes: medium (weighing between 20 and 45t) and heavy (46 to 70t) – with the latter having to beef up formations of the former or to form the core of tank assaults.<sup>9</sup>

There continued to be light armored platforms for cavalry functions and purposes of reconnaissance traveling on either wheels or tracks. At the same time the mechanization of the artillery made some progress, albeit limited. But the infantry operating in close cooperation with tanks (armored infantry or, in German, "Panzergrenadiere") still rode on fairly lightly protected half-track (US Army) or three-quartertrack (German Army) vehicles.

The Soviet practice constituted the worst case for this kind of infantry. Since the Red Army was short of half-tracks (home-produced or delivered by the United States), but insisted on a very close cooperation between tanks and foot soldiers, the tanks had to give the latter a ride into combat – with droves of poor infantrymen clinging to the machines' outer crust, devoid of any protection.

The loss rate of this Soviet 'tank infantry' turned out to be horrendous. But even the German *Panzergrenadiere* who traveled on platforms of their own, enjoying at least some armor protection, suffered to an appalling extent. This was because the German doctrine on the use of armored infantry demanded a far closer coordination with the tanks' action than suggested, for instance, by US Army ruling. In other words, the Panzergrenadiere could get directly involved in tank encounters, yet having much less protection than the heavy fighting machines they accompanied.

High loss rates are, of course, always deplorable. In this case, however, there was a particular reason that added to the affected armies'

<sup>&</sup>lt;sup>9</sup> Another option of 'beefing up' was turning tanks into "tank destroyers" by doing away with the revolving turret and, instead, equipping them with a more powerful gun in a frontal casemate. But this was basically an improvisation and had tactical disadvantages.

concern: the infantry trained to ride and fight together with tanks constituted an elite whose casualties were difficult to replace.

## 5 East v. West: tanks as hard currency

As the Cold War evolved, the very large tank fleet of the Soviet Union and its 'satellites' became a symbol of military might – of the potential to offensively project power. The West attempted to compete: building more and more machines on its own. But as the total number of NATO tanks never matched the other side's, increasing quality was seen as a means to reduce the East's advantage.

When in the beginning of the 1980s the Warsaw Pact had maintained its quantitative edge, and when at the same time it appeared to influential military experts that the opponent's tank designers had significantly narrowed (or even closed) the quality gap, there were extraordinarily alarmist voices in Western circles. They called for drastically beefing up NATO's conventional defenses and/or reemphasizing – while it was in a crisis of credibility – nuclear deterrence through enhanced warfighting capabilities.

An independent analysis demonstrated, however, that the threat of the alleged multiple superiority in tank power was over-rated by far. Neither had the East closed the quality gap, nor did the Warsaw Pact's quantitative advantage matter much, for its forces were handicapped by serious problems of allocation – in other words, of getting enough machines to the right place at the right time (the inner-German border namely).<sup>10</sup>

In the first two or three decades of the Cold War there was a consensus that the West's overall defensive strategy should be reflected in an equally defensive operational doctrine for the ground forces. The idea was to hold a line – which only allowed for tactical flexibility, not for maneuver at the higher levels of command.

During the final phase of the East-West conflict, however, when

<sup>&</sup>lt;sup>10</sup> M. Chalmers and L. Unterseher: "Is there a Tank Gap? A Comparative Assessment of the Tank Fleets of NATO and the Warsaw Pact", Peace Research Report, No 19, University of Bradford, Bradford 1987.
there was much emphasis on augmenting the West's conventional strength, a tendency gained momentum to make better use of one's tank forces' true talents by keeping them on a longer leash: for more and deep – offensive – maneuver. This became manifest in the US Army's operational doctrine (100-5) of 1982. Dieter Senghaas, the renowned German political analyst, spoke of a "sovietization of NATO". In other words, the West intended to 'pay back in the alleged challenger's currency'.

Appeals by independent military experts to truly concentrate on the defense and stop provoking the adversary, which were first voiced in the 1950s and gained considerable public attention throughout the 1980s, were without appropriate reaction by Western authorities.<sup>11</sup>

The concept of an alternative, *confidence-building defense* for better crisis stability and as a policy to help curbing the arms race based its argumentation on experience (relevant successes of the defense in WW II), advances in light precision-weaponry as a means to strengthen an in-depth infantry array, and on systematic gaming. The resulting schemes appeared to be relatively 'light', but the more pragmatic ones nevertheless saw an important – namely troubleshooting – role for armor. Nonetheless the overall message of such modeling was not to imitate the other side, but to 'pay back in another currency'

But back to the 'official' development of armored forces! What were its general tendencies?

a) There was a certain differentiation at the divisional level – with two main types of such formations evolving: the armored (or tank) division and the mechanized division.<sup>12</sup> Not surprisingly, the armored division was considerably 'heavier' than the mechanized formation, namely because its ratio of tanks to armored infantry fighting vehicles (or protected infantry carriers) appeared to be higher. In comparison with WW II predecessors, however, the mechanized division was rather heavy too.<sup>13</sup>

<sup>&</sup>lt;sup>11</sup> It was Mikhail Gorbachev who understood the message.

<sup>&</sup>lt;sup>12</sup> "Panzergrenadierdivision" in the Federal Republic of Germany, and motor-rifle division in the East.

<sup>&</sup>lt;sup>13</sup> In the course of the Cold War there were also developments leading to the creation of light (mechanized) infantry divisions. Like the emerging types of

b) Military experts made quite a bit of a fuss over the necessity to fight "combined-arms" style. In other words, a lot of conceptual work and field trials was invested into – further – improving the cooperation between tanks, armored/mechanized infantry and artillery. Here the West took the lead – with the Soviet Army trailing behind, as over a longer period of time its artillery mechanization had not kept pace with other programs of modernization.

c) At the beginning of the Cold War there was still the division of labor between medium and heavy tanks, with the latter having to cover the movement of the former. For reasons of tactical simplification and logistical standardization this differentiation disappeared in favor of the medium-heavy machines, however. At the same time what began to be called "main battle tanks" (MBTs) grew in weight: from between 35 and 50t in the late 1950s to 40-60t by the end of the 1980s.

d) Step by step the armored vehicles for the infantry that had to directly operate with tanks also got heavier and better protected.<sup>14</sup> Yet there remained a significant gap. While in 1990 the heaviest mechanized infantry combat vehicle (MICV), the German MARDER, weighed about 30t, the tank to be accompanied in battle, the Leopard 2, had about 55t (with a complement of 10 on the former and a crew of 4 on the latter platform).

#### 6 Peripheral wars: armor rendered residual

In the Vietnam War there were tanks too. These got reduced to a more or less residual role, however. The South-Vietnamese and the Americans mostly employed them as heavy escorts of troop convoys riding on insufficiently armored carriers (M 113). But the job of transporting infantry into tactical encounters with the enemy and providing it with some fire support was to be accomplished mainly by utility

heliborne formations they appeared to have a dual purpose, however: for use at the 'central front' *and* in peripheral conflicts.

<sup>&</sup>lt;sup>14</sup> The Soviet Army had pioneered the concept of the modern infantry fighting vehicles, but finally trailed behind leading Western forces when it came to armor protection.

helicopters (especially the UH-1).15

The other side used tanks too – but only in the final phase of the war. When the North-Vietnamese (Viêt Minh) generals found that their foe was about to get weaker, they tried – in the region of Hué – a tank attack and fared badly. It was still too early to come out into the open. When the South was about to collapse, however, the chances had improved. Tanks were used to spearhead the Viêt Minhs' drive of 'liberation': symbolically announcing that the days of hit-and-run guerrilla action were over and stately normality had come.

There are two main reasons why in the Vietnam War armor had only such limited relevance. On the one hand, military action typically occurred in extremely broken terrain with very short lines of sight. Tanks do not like that. And on the other hand, the Viêt Cong, the Southern insurgent organization, but for a long time also the regulars from the North, employed guerrilla tactics of the higher order: flexible and fluid. This required an appropriate response which, so it was assumed, only heliborne forces might be able to provide.

Not at first, but certainly at second glance the conditions under which the Soviet Army had to fight in Afghanistan appear to be not very much different from those encountered by the US forces in Vietnam. The same applies to the Soviets' military response. There were at least notable similarities: emphasis on helicopters, armor reduced to escort functions.

Probably because the Afghan campaign had not been successful, or because there was a shortage of good-quality assault infantry, the Russian Army soon after the demise of the Soviet Union attacked rebel Chechnya with armored forces consisting of medium-weight MBTs accompanied by only lightly protected mechanized infantry cum artillery. The results were disastrous. Especially when these forces drove into urban areas defended by Chechen guerrilla fighters they suffered horrendously. Quite a few tanks were destroyed, but worse: the regiments of mechanized infantry lost most of their armored transport or fighting vehicles.<sup>16</sup>

<sup>&</sup>lt;sup>15</sup> Later there appeared genuine helicopter gunships (the "Huey Cobra" based on the mechanics of the UH-1).

<sup>&</sup>lt;sup>16</sup> C. W. Blandy: "Chechnya: Two Federal Interventions. An Interim Comparison

Armor had heavily suffered too when at the beginning of the First Gulf War a brainlessly schematic offensive of Saddam Hussein's army into Iran got stopped. The intruding troops were annihilated piecemeal-fashion or driven back by swarms of light motorized *Pasdaran* contingents fighting in a fluid and improvised manner.

In the Second and in the Third Gulf War the respective US-led alliances seemed to have made much better use of armored cum mechanized forces than Saddam in his younger years. In both cases such elements successfully spearheaded powerful drives into enemy (-held) territory: against armor and over suitable ground. There have been critical voices, though, claiming that in situations characterized by one's own forces' near-total superiority in intelligence and in firepower (generated by artillery and air assets), heavy tanks would not be necessary anymore. They could be substituted for by considerably lighter platforms, and there would still be the same chance of success. The advantage of such a substitution is said to be an increase in the capability to project power: as the vehicles in question lend themselves to much easier and quicker transport.

# 7 Current prospects: light forces – heavy fall back

It may well be that in an encounter in which one party has (older vintage) armor, while the other one enjoys huge advantages in intelligence and general firepower, the armor does not necessarily have to be confronted by structurally symmetrical forces. In this case the overall superiority of one side allows for a somewhat lighter substitute. But what about scenarios which are more typical of our time and the most

and Assessment", Conflict Studies Research Centre, Camberley, January 2000.

US and British armored forces, including their mounted infantry, had almost no casualties, however, when they swiftly advanced through urban areas in the Third Gulf War. But this was not so much due to good tactics than to the fact that the opposing forces did not really oppose them and that the Baath regime, for reasons of representation and suppression, had cut broad and straight lanes across the Iraqi cities with their maze of medieval rows and curving streets.

likely future: implying missions of peace enforcement and peace support, of *stabilization* namely, in countries otherwise torn by civil war and terrorism?

Those – Western – military experts and leaders, who wanted to do away with the tank once and for all, argued that missions of stabilization, as there were no opposing elements of armor, would permit even more to discard traditional tank technology and to mainly rely on light to medium mechanized forces riding on vehicles weighing around 20t.<sup>17</sup> In the end there could be one basic platform on which to build a family of vehicles for a variety of different tasks. In the light of logistical rationalization and ease of strategic transport this seemed to be quite an attractive option.

But what about medium-weight forces, with standard platforms carrying complements of up to 11 or 12 soldiers, getting ambushed by insurgents? And what if one – quite plausibly – assumed that the latter had planted powerful Improvised Explosive Devices (IEDs)<sup>18</sup> and were equipped with simple grenade launchers (RPG-type) capable of defeating light to medium armor from short distances? And if one further, with likewise plausibility, made the assumption that the threat were especially directed at the flanks and the rear of vehicles (which often lack protection)?

The proponents of the all-light-to-medium idea would concede that this looked like an unhappy situation preferably to be avoided. Their solution: to electronically integrate and make available to the tactical commander on the spot all relevant information – thereby creating such a high degree of *situational awareness* that he could in a timely fashion withdraw and/or request the immediate delivery of protective fire from artillery or air assets.

Sober analysis cannot accept, however, that in the fog of an antiguerrilla war such an approach could form the standard rule. Intelligence, even if gathered and processed by the most advanced means of technology, is not very likely to fully neutralize the advantages of a foe

<sup>&</sup>lt;sup>17</sup> Somewhat less for transport (to fit the C-130, still and for many years to come the World's most common military air lifter), and somewhat more for additional protection in combat.

<sup>&</sup>lt;sup>18</sup> Makeshift roadside bombs often triggered by radio signal (from a cell phone).

with intimate terrain knowledge who applies tactics of amorphous fluidity and employs inventive camouflage techniques. In other words, there is no way around a more reliable way of enhancing one's troops survivability.

It would be misleading, however, to suggest putting all relevant force elements on heavily protected platforms. On the one hand, despite all innovations in passive, reactive and active armor,<sup>19</sup> there remains a significantly positive correlation between the weight of a vehicle and the level of its protection. But on the other hand, vehicles at the upper end of the weight spectrum tend to lack agility and endurance, cost a lot of money and often send the wrong signal to the locals who may feel to be (further) provoked by machines that appear to be quite threatening. This is why such platforms cannot be employed in missions of stabilization on a grand scale.

If a certain degree of – nonprovocative – omnipresence of a peacesupporting force is required, if showing the flag is to be flexible and affordable, there appears to be no way around a large fleet of wheeled vehicles. Building on developments during the Cold War, when wheeled armored vehicles were by some armies in the West and all in the East used for reconnaissance and troop transport, there has been in recent years a veritable surge in production of such platforms. Some are in the weight class between 15 and 30t, but most are below that category.

Particularly the vehicles weighing around 10t (preferably fourwheeled) lend themselves well to purposes of reconnaissance and widearea patrolling. They would combine relatively low crew fatigue and long endurance (typical of most wheeled carriers) with agility and at least some passive crew protection (against infantry weapons and mines). They should and could be rather compact if they would only carry a crew of one or two and half the standard complement of 8 soldiers for dismounted action.<sup>20</sup> Troop survivability would lie in the fact that there are several vehicles, each with 'not too many eggs in the basket' – and also in qualities such as agility, compactness and (modest)

<sup>&</sup>lt;sup>19</sup> See the essay "Wheels or Tracks..." in this book.

<sup>&</sup>lt;sup>20</sup> The vehicles could operate in pairs to assure that there would be the tactical entity of 8 for action.

armor protection.

Such a scheme would not render heavy armor superfluous, however. Armor (along with tube artillery)<sup>21</sup> could act as the core of light patrol forces and as their fallback. It should be kept less visible than the light elements and appear only when absolutely necessary – in contingencies of calculated, limited escalation such as the assault on a terrorist stronghold, the evacuation of hostages under heavy protection or the reinforcement of endangered patrol forces.

For such missions there is no requirement for new types of tanks, but an adaptation of the existing modern ones to enhance their efficiency cum survivability in asymmetrical encounters (better and more effective allround armoring, installation of an automatic grenade launcher, improved communication with other friendly forces etc.).<sup>22</sup> These tanks may, in the future, be accompanied or even – partly – substituted for by relatively heavy, armed<sup>23</sup> and armored infantry carriers which in the context of certain high-risk missions would guarantee a very good chance of troop survival and be tactically more adequate than gun tanks (while probably appearing somewhat less provocative than these).

The German Army is about to put into service the PUMA, a MICV weighing with modular add-on armor well over 40t. As this may not prove sufficient, however, we have to look at Israel and Jordan where considerably heavier machines have been designed and, in the former country, fielded as well.

The Jordanian carrier (TEMSAH: *crocodile*) is a derivative of the old British Centurion tank, whereas the Israelis have been using the Centurion too, but also the old Soviet T 55 and their own Merkavah (especially the Mark 1) as basic platforms on which to mount the new superstructures for high-quality infantry.<sup>24</sup> The most recent Israeli

<sup>&</sup>lt;sup>21</sup> See the essay on "Mechanized Tube Artillery..." in this book.

<sup>&</sup>lt;sup>22</sup> H. J. Wagner: "Leopard 2 A4 Evolution", *Strategie und Technik*, April 2008, pp 13-15.

<sup>&</sup>lt;sup>23</sup> Such platforms are typically equipped with externally mounted weapons: machine guns, machine cannon and/or automatic grenade launchers. Precision-guided missile systems could be added.

<sup>&</sup>lt;sup>24</sup> The MBTs of the Merkavah series have a frontal engine and can take on board, if most of the ammunition for their gun is removed, a group of infantrymen for

development is called "NAMER": *Tiger* (with a total complement of 11). This machine and its Jordanian counterpart have the appearance of a box – though with a sloped glacis.

We may presume that this shape has a future: *Finally, armor will look like a box again*.

Berlin, January 2008.

#### Bibliography

Fuller, J.F.C.: *The Reformation of War* (New York: Dutton, 1923).
Guderian, H.: *Achtung – Panzer! The Development of Armoured Forces, their Tactics and Operational Potential,* Introduction by P. Harris (London: Arms and Armour Press, 1995).
Hilmes, R.: *Kampfpanzer* (Stuttgart: Motorbuch, 2007).
Liddell Hart, B. H.: *The Memoirs of Captain Liddell Hart* (London: Cassell, 1965).
Messenger, C.: *The Art of Blitzkrieg* (Shepperton: Ian Allan, 1976).

Senger und Etterlin, F. M. von: *Taschenbuch der Panzer* 1983. *Tanks of the World*, translated by R. Simpkin (Munich: Bernard & Graefe, 1983).

Unterseher, L.: "Gepanzerte Fahrzeuge – wohin geht die Reise?", *Soldat und Technik*, November 2003, pp 10-13.

special missions. In this respect these tanks were the forerunners of the heavy carriers. Designing the new NAMER, with its heavily armored rear ramp, could benefit from the unique power-pack arrangement of the Merkavahs (as all other contemporary MBTs have their engines in the back).

# MECHANIZED TUBE ARTILLERY AS AN INTEGRAL ELEMENT OF EXPEDITIONARY FORCES

#### 1 Alternatives to artillery

Somewhat before the demise of the Crusader system, which would have been the world's heaviest mechanized howitzer, a vivid discussion on the future of artillery began. This has further intensified in the related debate between the proponents of solid armor and the advocates of 'traveling light'.

Some military experts<sup>1</sup> believe that artillery, its mechanized variant in particular, has lost much ground to the relatively simple and rugged mortar for indirect-fire support. They argue that the mortar is effective because of its organic integration with the lower levels of tactical ground mobility (i.e. battalions and companies), its short reaction time, its high rate of fire and, especially, its lower weight that lends itself to rapid transport over longer distances (strategic mobility.) For these experts the mortar's advantages in the present strategic environment constitute this weapon's 'renaissance'.

Mechanized artillery systems, which give protection to their crews, are said to be far too heavy to meet the challenge posed by contemporary scenarios that require speedy operational or strategic deployment. In contrast, mortars, weighing only several hundred kilos, can be used in paradrop operations and also issued to heliborne infantry. And it is suggested that in scenarios involving counter-battery fire (in other

<sup>&</sup>lt;sup>1</sup> See for example J. Boatman, M. Hammick, and G. Turbé: "Mortar Moves", *International Defense Review*, Vol 25, December 1992, pp 1157-1162.

words, an adversary striking back at one's own positions) mortars can be mounted on armored personnel carriers in order to give their crews some protection with a systems weight still considerably below that of standard mechanized artillery.

There is yet another faction of military experts, however, who express grave doubts in the raison d'être of state-of-the-art artillery.<sup>2</sup> They may or may not accept the notion that there has been a renaissance of the mortar in the context of modern intervention scenarios. But this is not their real concern.

Instead their interest focuses on a revolutionary solution to the problem of indirect-fire support for ground-mobile forces – namely on the systematic "tapping" of all elements of fire that can be brought to bear in a given location, in the shortest possible time. In this context, the buzz word is networking, or network centric warfare, to be made possible by advanced means of electronic communication and data processing.

They believe that inter-arms and inter-service networking would render realistic a flexible combination of fires from rather different sources: such as naval artillery with enhanced (inland) ranges and increased precision, fixed-wing or helicopter gunships, armed UAVs, cruise missiles, tactical ballistic missiles, fighter bombers and even strategic airpower with modern munitions. In the extreme one might imagine a battalion of land forces engaged in a peace-making effort getting adequate tactical fire support without reliance on any groundmobile artillery.

# 2 Alternatives and their shortcomings

The proposed alternatives to modern artillery are not as convincing, however, as they appear at first glance. Let us first examine the case of the mortar. Such weapons have quite limited effective ranges. Normally their radius of fire does not exceed 10 km which translates into an

<sup>&</sup>lt;sup>2</sup> See H. W. de Czege: "Revolutionizing Firepower: the enabling destructive and suppressive element of combat power", *Field Artillery Journal*, 01 July 2003 and "Network Centric Warfare", DoD Report to Congress, 27 July 2001.

area coverage of about 300 square-kilometers.

Likewise there is a significant limitation on their caliber. In general it is not larger than 120 mm. Mortars with larger calibers have been phased out nearly everywhere. Their clumsiness, high weight and forceful recoil, which demand fairly heavy, tracked platforms, neutralize the key advantages of the mortar, namely its lightness and flexibility.

By comparison standard tube artillery has a larger caliber (West: 155 mm / East: 152 mm) than practically all mortars. As a result there is much more volume for explosives and warhead sophistication – i.e. bomblets and precision guidance. This fact must be weighed against the higher firing rate of the mortar, however. Furthermore, modern standard tube artillery typically has a much longer range, of about 40 km, which translates into an area covered of roughly 5,000 square-kilometers: over 16 times more than achieved by the mortar.

This allows a few gun batteries in separate locations to cover wide areas, and if ranges overlap, to flexibly shift the center of impact: generating tremendous fire concentrations. Its capacity to cover wide areas and to rapidly concentrate fire with just a few systems gives considerable advantage to tube artillery over mortars in comparisons of flexibility and cost-effectiveness.

And it should also be noted that unlike most mortars all tubeartillery pieces can be employed in the direct-fire (line-of-sight) mode: something that may prove life-saving in an emergency. Think of a battery of guns that all of a sudden has to deal with a breakthrough of insurgent forces!<sup>3</sup>

The organic integration of the mortar component with battalions and even companies of the ground forces can indeed be tactically advantageous. But it should not be overlooked that artillery, albeit at higher levels of organization, also enjoys a degree of integration that could be helpful in providing its personnel with an adequate frame of reference, or situational awareness, in the sense of receiving guidance through human interaction. This is exactly what would be missing, if there were total reliance on networking with many critical military

<sup>&</sup>lt;sup>3</sup> Recently a few mortars capable of line-of-sight fire have been developed; an option gained at cost increases and losses in ruggedness.

assets belonging to other organizational entities.

Traditionally the key advantage of artillery over mortars lies in its optimal access to intelligence. Often the only relevant information that mortar crews get are more or less garbled target reports from forward troops. The artillery may receive the same, but has at its disposal ample facilities to collect and systematically evaluate other data: to verify troop reports and guide its fire.

In order to cross-check troop reports, to complement or to substitute for them, modern artillery management systems integrate and process data from a broad spectrum of sources: among them acoustic sensors, counter-battery radar, photographic or thermal images gathered by UAVs of varying ranges and endurance or by tacticalreconnaissance aircraft. Satellite information can be factored in as well. Along with operational guidance, all this information, which is for the most part real-time (or near-real time), forms the basis of modern artillery's command and control systems.

The advocates of network-centric warfare suggest that the artillery should lose its privileged access to battlefield intelligence. They propose to give all relevant data to all assets of fire or at least to all organizational positions in charge of ordering fire. This implies that the leader of a mortar company would immediately have available several additional sources of intelligence: ideally those that could enable him to optimize his unit's fire.

There might be strings attached, however. Who decides, for instance, which information is really useful for a mortar company? If it is the company commander himself, he may suffer from information overload and thereby feel hampered in his ability to quickly react to a challenge. And if it is some higher-echelon position, the results might be delays and, again, losses in flexibility. Generally speaking, data have to be used that come from rather diverse – and organizationally distant sources; a fact that may give rise to questions about their reliability.

And there may arise comparable problems, if at a higher level of organization, say by the commander of a battalion or larger combat team, concentrated and immediate fire support is needed. According to the networkers all relevant target and battlefield information would be made available and at the same time linked with all potentially applicable assets of fire. Again we have the question of relevance: who selects the data according to their usefulness – and with what effect on flexibility and timeliness? Can the data be trusted as if they were coming from an information system of long-standing integration, specialization and practice – organizationally close to the fighting formation? In other words, would the intelligence be as valid as the one provided by an organic artillery information system?

And finally, we find in this context a problem of fire allocation. In the case of an assumed posture without or with only insufficient artillery, for reasons of cost there cannot always be air- or seaborne fire assets within easy reach to provide support in a quick-reaction mode and with the right dosage. Often relatively long distances would have to be covered, resulting in tactically unacceptable delays.

Furthermore, the assets available in a given region may only be able to produce the "wrong" kind of fire: too big or too small a blast or not sufficiently accurate (we know, for instance, that GPS-based navigation, which has become so popular with the US forces, does not provide the acme of precision).

There may also be situations characterized by a momentary affluence of fire assets, however. Their easy availability could lead to another problem. Might not an oversupply in firepower induce commanders to employ too much of it – with grave consequences in terms of collateral damage? And collateral damage is highly counterproductive in typical peacemaking or peace-supporting efforts.

#### 3 More artillery or more armor: question of purpose

Modern intervention forces are geared to travel light. Otherwise quick-reaction strategic mobility would be impossible. Strategic mobility often goes together with the capability to swiftly move in a theater, in other words: operationally. Good operational mobility is required for wide-area patrol (and control) missions, as well as for far-reaching pursuit.

Because mobility is so vital, light forces have become center-stage assets. But even in contemporary scenarios light troops may need some kind of a more substantial back-up, or spearhead, if the going gets tough. In this context the question is: what should play a more prominent role: armor or artillery?<sup>4</sup>

Let us first examine the particular characteristics of armor, in other words main battle tanks accompanied by platforms for immediate support. Armor has been successfully employed in flexible positional warfare, as was demonstrated by two Israeli brigades defending the Golan heights against the Syrian onslaught in the October War of 1973.

To most proponents of armored warfare, however, this constituted an abuse. According to them such forces should preferably be employed in a manner that makes the best use of their true talents to dynamically affect the correlation of forces. This suggests that armored forces, be it in deeply-penetrating breakthrough operations, in bypassing marches of long reach or in concentrated counterattacks against the flanks of an invader, excel other force elements in their ability to change the course of events. Edward A. Shils, the American military sociologist and theorist, spoke in this context of a dramatic ("theatrical") function often outweighing the actual fighting value of armor as a mere accumulation of mobile platforms.

When armor comes rumbling along, when it exerts shock power, it appears to be highly aggressive and provocative. This may be appropriate for missions aiming at the conquest of territory or the repulsion of an invader. But in scenarios of peace support with only small and distributed pockets of resistance, the use of armor in a concentrated, shock-type mode is likely to be counterproductive. It can easily send the wrong signal and may provoke additional violence.

And this problem could be aggravated by the fact that armor typically arrives on the scene a considerable time after the initial violence. In a region with skirmishes and terrorist activities flaring up here and there, it is near-impossible to have heavy armored forces always waiting around the corner. And when they arrive with a delay, they may

<sup>&</sup>lt;sup>4</sup> When we say 'armor' we do not accept the notion that the tactical functions of hitherto heavy shock forces can be totally taken over by a high-tech, light- or medium-weight future combat system like the one the Americans are committed to developing. Likewise we reject the notion that a network-based array of diverse assets of fire can wholly substitute for artillery.

further exasperate an escalatory process already under way.

Let us now take a look at the role of the artillery in modern intervention scenarios! On the one hand it is still very much a supporting arm when it serves as a complement to armor in dynamic operations. Sometimes it may act as a penetration aid when breakthrough attempts are made and sometimes it may fire barrages for the protection of the flanks of mobile columns.

On the other hand, we see the emancipation of the artillery as a genuine fighting arm. Based on optimal organic intelligence about relevant crisis spots (we remember that it has its own information system) artillery can react with almost no delay and, if need be, on its own. Wide areas can be covered without having to move around complex platforms and their logistical tail. Artillery ammunitions have become increasingly accurate; flexible concentrations of fire as well as the fine-tuning of its effects are ever more possible. No longer is it that only stationary targets, such as terrorist strongholds, can be dealt with effectively, but also mobile ones can now be hit with high and still rising chances of success.

Furthermore artillery action can be regarded as considerably less provocative than the massive use of armor. No rumbling monsters are spreading shock, fear and anger among civilians, but certain targets are taken out, ideally in a surgical manner and with very limited collateral damage. Such an approach to the use of heavy fire power appears to fit in better than a show of brute force with missions of creating and stabilizing peace.

It is true that the artillery can act in a stand-alone manner – a quality giving this force component additional tactical usefulness. Normally though, peace-related missions, which tend to be highly complex, see light troops with or without armor protection in the line of first contact. They march faster than heavy armor, enjoy a wider spectrum of options relevant to scenarios of insurgency, can be – for reasons of relatively low cost – held in larger quantity, and are easier to spread out for immediate (re)action. It is mainly with such forces that modern artillery must interact in crisis situations.

It should be stated clearly, however, that even in the context of military interventions for stabilization there remains a vital role for heavy armor such as in rescue/evacuation missions requiring the heaviest of protection. The US military may have learned this lesson painfully in Somalia in 1993.

#### 4 Tube or rocket artillery: rational choice

When it comes to the choice as to what kind of artillery should be given to intervention forces, there are expert voices proposing a more generous use of rocket artillery.<sup>5</sup> Their list of supporting arguments follows:

a) Modern mechanized rocket systems are not heavier than middleweight tube artillery. The original American MLRS, for example, is in the same weight class as the old M-109 howitzer. And there are several types of standard mechanized tube artillery – in Britain, France, Germany, Russia etc. – which are considerably heavier. Interestingly, the US Army has introduced a lighter version of the MLRS, the HIMARS (HIgh Mobility Artillery Rocket System), which weighs only 15 metric tons and carries the same missiles as the original launcher, but only half the number. All this suggests that rocket artillery systems are more suited for strategic transport by airlift than mechanized tube artillery.

b) The relatively low weight of rocket launchers, the HIMARS in particular, and the absence of recoil when the missiles are fired have made it possible to base such systems on wheeled platforms. In the case of the HIMARS the platform is a very lightly protected 6x6-truck with reasonable cross-country performance. This enhances the systems' operational mobility which, in turn, improves fire allocation by adding to the system's effective operational range which is already quite impressive based on the missile range alone.

c) Current MLRS missiles can cover roughly the same distance as a standard howitzer (155 mm), with a long barrel and firing "base-bleed" projectiles. However, the MLRS range of about 40 km has recently been extended to ca. 70 km. The first phase of the missile's flight is ballistic, while the second is aerodynamic. This means that if counter-battery radar only manages to detect the second phase it is impossible to de-

<sup>&</sup>lt;sup>5</sup> See Meguid Darwish: "Artillery, Rocket and Missile", in T. N. Dupuy, ed., International Military and Defense Encyclopedia (Washington D.C.: Brassey's, 1993) pp 281-287.

termine the location of the firing unit from projection of the flight path.

d) In the days of the Cold War rocket artillery systems were meant to deal with avalanches of armor coming at one's positions. It was intended to fire large salvos of rockets into the enemy's avenues of advance with the warheads carrying minelets and bomblets (the latter designed for top attack.) Although there were costly attempts to develop warheads with terminal guidance, the emphasis clearly lay on the rather indiscriminate application of massive firepower. When the integration of MLR batteries into modern expedition packages got onto the agenda this history became a drawback, as most intervention scenarios require a fine-tuning of firepower rather than its abundant use. But this legacy is over now. New generations of missiles for MLRS/HIMARS, and probably other systems, are going to have a GPS linkage providing relatively inexpensive precision guidance (the launch vehicles do have GPS navigation anyway.)

Advocates of prominent employment of tube artillery in expeditionary forces are not convinced by these arguments for the advantages of rocket artillery with respect to mobility, range of fire and accuracy. They point to the fact that there have been promising developments of mechanized guns in the middle or lower weight categories, some even on wheeled platforms, that compare well with rocket artillery in regards to strategic and operational mobility.

Because the quality of information deteriorates with distance, they do not see much of a tactical advantage for rocket artillery in ranges considerably over 40 km. They point out that significant range extensions for tube artillery are feasible as well – namely through Rocket Assisted Propulsion (RAP), but would readily concede that this would still imply a ballistic, and therefore measurable, flight path.

And with respect to accuracy they might stress that GPS is, in principle, jammable and that tube artillery has for "natural" (physical) reasons a significantly smaller CEP than rocket systems: a quality which is an excellent precondition for the development of cost-effective terminal guidance.

Apart from that there are four critical observations which all suggest that rocket artillery has deficits in tactical flexibility:

a) Rocket artillery cannot fire at point-blank ranges. Furthermore, there is an inner radius of up to 10 km within which an MLRS or

HIMARS (or similar rocket launchers) are unable to serve targets. Tube artillery has no such limitations.

b) MLR systems were invented to produce dense volleys of fire – something tube artillery can only achieve by the simultaneous action of whole batteries. But the reloading procedure of modern guns is a lot quicker. Guns can deliver several shells a minute and can be fired in a manner so that several rounds strike the same target at the very same time. The recharging of an MLR system may take up to half an hour.

c) While guns can easily fire a broad spectrum of shell types, rocket artillery normally has a more limited number of different warheads. Warheads which are not within the weight and shape parameters of the original rocket design may negatively affect the flight characteristics (including the accuracy) of the missile. This limitation applies especially to rockets which are spin-stabilized: something quite common among modern designs.

d) Missile packages for MLR systems tend to be very bulky and thereby create logistical problems exceeding the ones experienced with tube artillery.

#### 5 State-of-the-art guns: systematic comparison

The argument in favor of mechanized tube artillery as an integral element of intervention forces will be rounded off by a presentation and systematic comparison of typical examples of modern mechanized guns of the lighter variety.

In our small sample there are three novelties: the French system CAESAR (CAmion Equipé d'un Système d'ARtillerie), the German AGM (Artillerie-Geschütz-Modul) and the Slovak ZUZANA ("Susan").

All three systems are able to travel by air. The lightest one, the French, which by the way is in the weight class of HIMARS or a mortar on a modern armored personnel carrier, can be lifted by a C-130, the most common military transport plane in the Western World.

The other two systems require aircraft in the upper medium-weight category – with about 30 metric tons payload or more, such as the Ukrainian Antonov 70 or the European A-400M (currently under development). Of course, the giant transporters of our time, C-5, C-17 or

Antonov 124, could each fly several of the artillery pieces in question.

All three systems do have very capable, long-range guns. Reloading is very quick: 6-8 rounds can be fired in a minute. Furthermore the systems' reaction time – into position, fire and leave – is extremely short and more than a match for mortars.

Profile	CAESAR	AGM	ZUZANA
Country of origin	France	Germany	Slovakia
Combat weight, metric tons	17.7	27	28
	wheeled		wheeled
Type of platform		tracked	
Crew, incl· driver	6	2	4
Caliber (mm) / length of			
tube	155 / 52	155 / 52	155 / 52
(cal)			
Max· range of fire	40	40	39
Combat load, shells/charges	18	30	40
Loader fully automatic	no	yes	yes
Rounds per minute (sus-	C	e	C
tained)	0	0	0
From march to first shot			
(minut	<2	0.5	<2
es)			
Leaving the position			
(minut	<1	0.5	7
es)			
Crew protection	very partial	all-round	partial
Sources: Martin Pöpel, own research (L· U·)			

*Comment:* The French CAESAR uses a six-wheeled truck of commercial make with cross-country performance (Renault). It is a very simple, low-cost design, and, due to the lack of automation, relatively personnel-intensive. There is very limited crew protection: only on the march, when the soldiers sit in the frontal cabin, but not during the fire fight. Although the gun is stabilized by hydraulic "stilts" when in position, it can only fire forward with no more than 15° deviation to both sides. Apparently, in the case of this system a number of potential qualities have been traded for low cost, ruggedness and strategic as well as operational mobility.

At 27t, metric tons, the German AGM is a relatively light-weight derivative of the Panzerhaubitze (armored howitzer) 2000 which has 55.5t and is considered the world's most capable mobile, protected artillery piece. Due to its high degree of automation the AGM can be operated by only two soldiers. Among the guns compared here, its reaction time is the shortest. As the system rides on an adaptation of the MLRS platform, there are logistical advantages. The platform being tracked, the gun does not need any additional stabilization and can fire 360°. Being tracked the vehicle does not enjoy the same operational – in-theater – mobility as the other two types. Instead it excels in tactical mobility and crew protection. Crew protection is notably all-round: against standard mines, shell fragments, small-arms fire, against top attack and NBC threat – in position and on the march.

The Slovak ZUZANA travels on the chassis of a heavy-duty commercial truck with eight wheels (TATRA 815). Although the initial development dates back to communist times, the model as it is now is a thoroughly modern design that fully meets NATO standards. In an overall rating of its performance and other relevant data it could be placed between the other two systems. It is particularly noteworthy that it excels in operational mobility and probably costs considerably less than the German model.

We have seen that in the case of the French system some qualities other models possess were traded for strategic and operational mobility. The US Army has driven this to the extreme in its plans to modernize traditional field artillery: something that would appear rather bizarre in good old Europe. It is as if one were attempting to combine the mobility of the mortar with the performance of modern standard artillery.

The Army is in the process of introducing its new field howitzer M777, to be towed by light, unprotected trucks. With a weight of only 4.5t, the system may claim excellent strategic mobility. And its operational mobility can be outstanding too: but only if the gun, the crew, ammunition and its navigation cum fire-management module are transported by heavy-lift helicopter. This is possible, but rather a costly undertaking. Otherwise the system has the mobility of World War II motorized artillery which was not particularly impressive.

As for the profile of tactical performance, the howitzer by no means measures up to our examples of modern mechanized artillery. The caliber is the same, namely 155 mm, but the barrel is shorter (39 cal. instead of 52) which translates into a maximum range of only 25 km. There is no ammunition carried directly at the gun. Only four rounds per minute can be fired. It takes three minutes to get ready to fire, and two to leave one's position. (All our mechanized systems are significantly quicker.)

As many as seven soldiers are needed to operate and move the whole arrangement, which is quite problematic in times of personnel shortage. There is no armor protection whatsoever – as if one were not planning for non-linear contingencies (for missions in civil wars or those affected by insurgent resistance) characterized by threats out of the blue and from all directions leaving no relatively 'safe rear' for the artillery.

In other words, what this new piece of American ordnance clearly lacks is balance. *If one intends to trade tactical performance for strategic mobility, one should not go further than the French Army, and not totally give up the idea of mechanization. Vive la France!* 

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#### **Bibliography**

"Artillery Rocket Systems: A Unique Market", *Military Technology*, Vol XI, Issue 9, 1987, pp 22-31.

Kühr, M.: "Artillery", in T. N. Dupuy, ed., *International Military and Defense Encyclopedia* (Washington, DC: Brassey's (US), 1993), pp 264-273. \_\_\_\_\_\_: "Artillerie", in J. Gerber and M. Kühr, eds., *Landkriegführung* (Bissendorf: Biblio, 2004), pp 1-14.

Pengelley, R. and G. Turbé: "Artillery fire control – new computer systems improve guns' effectiveness", *International Defense Review*, Vol 21, August 1988, pp 961-972.

Pöpel, M.: "Rohrartilleriesysteme der Zukunft", *Strategie und Technik*, October 2005, pp 39-42.

Turbé, G.: "Der 120-mm-Zugrohrmörser. Die Artillerie des Infanteristen und der Schnelleingreiftruppen", *Internationale Wehrrevue*, Vol 18, March 1985, pp 403-404.

# Addendum

Recent conceptual developments in the German Army (H. Fischer: "Artillerie – Quo Vadis?", *Strategie und Technik*, January 2008, pp 20-25) suggest that the basic artillery module of its peace-support forces is likely to have the size of a battalion: typically to be attached to a light or medium intervention brigade. It would organically integrate three different functional elements – namely:

- one battery / company: reconnaissance; data processing; communication; fire management (including networking with other sources of intelligence and/or fire),
- one battery of light mechanized rocket artillery, and
- two batteries of light/medium mechanized tube artillery.

It is particularly noteworthy that the data handling capacity of this formation is seen as the basis of the network for the co-ordination of fires also from other sources. To entrust the artillery with this task means honoring its particular tradition of fire management, its integration with the main elements of the ground forces, and the fact that this arm itself continues to provide the most adequate fire support.

# WHEELS OR TRACKS? ON THE 'LIGHTNESS' OF MILITARY EXPEDITIONS

#### 1 Shinseki's vision

Most armies with fighting experience in World War II drew the lesson that in future ground combat the hard currency of power would be medium to heavy tanks – accompanied by tracked platforms carrying infantry and artillery. Wheeled armored vehicles, if used at all, would be confined to the roles of light reconnaissance and armed area control. Among the armies following this line of thought were both the British and the French, due in part to their long tradition of expeditionary activity.

One notable exception to the trend was the Soviet Army. During the 1950s the Soviets put the bulk of their infantry on wheeled armored carriers. Even after the advent of tracked mechanized infantry fighting vehicles during the 1960s (for instance, the BMP and its forerunner the BTR 50), a large part of the Soviet infantry continued to ride on wheeled platforms. Indeed, two out of four regiments in a motor-rifle division rode on wheels (BTR 60/70/80). In addition there were relatively strong components of armored reconnaissance that to a large extent also had light wheeled vehicles, including the BRDM 1 and 2.

The Warsaw Pact's military leaders had two reasons for giving wheeled vehicles a big role. First, they thought that wheeled armored transport would be better than tracked in moving large masses of soldiers over long distances; second, they thought these vehicles could do the job at relatively low cost.1

Since the end of the East-West-confrontation, there has been in NATO and in non-aligned countries as well a general drive to develop expeditionary forces in order to deal with regional crises and conflicts. In this context, light ground forces, and especially those riding on wheels, have gained a more prominent role. Underlying this development is the assumption that such light units are more appropriate than the traditional 'heavy mix' for patrolling and controlling relatively large stretches of land. They supposedly are well-suited to establishing a sort of 'military omnipresence' which is essential to the restoration of law and order in peace support/peace enforcement operations.

More recently, the US Army Chief of Staff, General Eric K. Shinseki, has advanced a vision of future American ground forces that would ride entirely on wheels. Looking perhaps 15 years into the future, General Shinseki foresees even a wheeled main battle tank (MBT), weighing 25-30 (metric) tons instead of the 60-65t typical of current vintage tracked monsters. This vision relies on future technological breakthroughs to give the light MBT and the wheeled armored vehicles supporting it a level of combat power (including survivability) that will exceed today's standard. In other words, technology is expected not simply to compensate for the weight loss, but actually to overcompensate for it.

General Shinseki's key reason for pursuing the goal of a much lighter mechanized force is a perceived need to substantially improve the Army's capabilities for rapid power projection across strategic distances. All-wheeled forces are supposed to require much less transport capacity than the current track-dominated mix – not only because the platforms promise to be lighter, but also because their logistical requirements are likely to be less. Complementing the switch to a wheeled force, the US Army also aims to streamline its combat support and logistical elements. In light of these complementary initiatives, General Shinseki thinks it will be feasible to deploy a strong US Army combat brigade to anywhere in the world within 96 hours. A full

<sup>&</sup>lt;sup>1</sup> The Soviet pattern was (or had to be) copied by the satellite armies. Socialist Czechoslovakia went so far as to mount even a heavy howitzer on a wheeled armored platform.

division is supposed to be globally deployable in 120 hours or less; for five divisions – a very powerful corps – the deployment goal is 30 days.

While setting a uniquely ambitious goal for rapid deployment, General Shinseki's vision does not at all relax the requirement for combat capability. The wheeled force is to be able to conduct Americanstyle 'decisive operations' across the mission spectrum. Thus, the US Army will stick to its prime concern: the ability to prevail quickly in the toughest conceivable warfighting contest. Unlike today's force, however, the proposed one will also lend itself quite easily to 'softer' missions – peace enforcement and peace support. Hence, General Shinseki may be preparing the US Army to undertake operations that in the recent past it would have preferred to leave to its allies.

General Shinseki's vision of a rapidly deployable, multifunctional ground force should grab the attention of armies the world over. The general promises to transcend a dilemma that has befuddled mechanized forces since their inception: deployability and sustainability versus capability. But how realistic is Shinseki's vision of standard light forces that can be entrusted to do almost everything? Perhaps General Shinseki's goal is feasible with regard to projection. But could it be that the forces to be projected will find themselves on arrival unable to do almost anything? In other words, will his vision lead to projection without power?<sup>2</sup>

We will find some relevant answers in a systematic comparison of tracked and wheeled armored vehicles, their technological limits and potentials.

# 2 Mobility

# 2.1 Strategic mobility

Today's tracked armored vehicles weigh between 3.5 and 65t. The respective figures for wheeled armor are 3.5 and somewhat over 35t. An

<sup>&</sup>lt;sup>2</sup> Although beyond the scope of this paper, it would be interesting to take a closer analytical look at the combination of 'right time and location – wrong, but abundant force'.

important qualification is that most wheeled types fall into the category of 'up to 20t'. Only about 10 percent are heavier. In the case of tracked vehicles, about half of current types are in the lower weight category, whereas the other half consists of heavier machines (mostly between 35t and 65t).

In addition to their relative lightness, wheeled vehicles tend to consume significantly less fuel (and other lubricants) than tracked armored vehicles of equal weight. (I will elaborate on this phenomenon below). Their relative 'lightness' and reduced logistical needs together give the wheeled family an edge over the tracked in strategic mobility – meaning the transport of forces over continental and intercontinental distances.

# 2.2 Operational mobility

Operational mobility refers to the ability to swiftly allocate and relocate forces within a theater of crisis or war. The challenge it poses is more on a regional than a continental scale. One factor relevant to operational mobility is the 'rolling resistance' of a vehicle traveling on ordinary roads. On roads the rolling resistance of tracked vehicles equals four percent of their weight, on average, while that of their wheeled counterparts (fitted with cross-country tires) equals only 2 percent of their weight. Consequently, wheeled vehicles need less fuel and can cover longer distances by road before they need to be refueled.

This advantage of wheeled vehicles disappears, however, when they move off roads. Then their fuel consumption may be at least as high as that of tracked vehicles (of equal weight). Still, if patrolling and area control missions are emphasized, road travel predominates and, thus, the advantage of fuel economy accrues to the wheeled class. Even in the context of typical warfighting scenarios, off-the-road activities constitute less than 50 percent of overall travel. This is because, within a sizeable theater, many movements have to be devoted to marching the troops to the combat areas in a timely fashion, rather than to maneuvering in the thick of battle.

There are two reasons that forces equipped with wheeled armor are more likely to deploy operationally in a timely fashion:

~ First, there are fewer and shorter refueling stops. (The average road

range of wheeled vehicles exceeds that of their tracked counterparts by 50-100 percent.)

 Second, the average marching speed of wheeled vehicles is, on roads, also 50-100 percent higher than that of tracked vehicles.

The fact that wheeled armor can cover longer distances faster than tracked vehicles is complemented by yet another advantage: there is much less fatigue for their occupants because the wheeled platforms do not suffer the vibrations generated by tracks.

In actual practice most armies recognize the overall advantages of wheeled vehicles with respect to operational mobility. Typically, they use wheeled carriers – 'tank trailers' – for the theater-wide allocation of tracked armor. This measure, which temporarily puts tracked vehicles on wheels, makes sense only as a stopgap; its disadvantages are quite obvious: It is expensive and makes marching columns clumsier and more vulnerable.

# 2.3 Tactical mobility

Tactical mobility is the kind needed when a force is in immediate contact with its adversary. Direct confrontation with an enemy imposes at least two mobility requirements:

- Good off-road mobility is an important prerequisite for evading enemy action and exploit unexpected avenues of approach.
- Agility a combination of high speed, good acceleration, and the ability to 'zigzag' – is also key to being able to respond flexibly to rapidly changing opportunities and challenges.

Relevant to off-road mobility, wheeled vehicles tend to have a ground pressure considerably higher than that of their tracked counterparts. The Mean Maximum Pressure (MMP), which is the average peak pressure under the tires of wheeled vehicles or under the road wheels of tracked vehicles, varies between 200 to 270 kN/m2 for the latter and 300 to 450 kN/m2 for the former. This implies inferior performance for wheeled vehicles on soft ground. There is at least one notable exception, however. The French Panhard VBL M-11 (a 4x4 vehicle weighing 3.55t)

has an MMP of only 220 kN/m2. In this case, a very light wheeled armored vehicle achieves an MMP in the range of tracked vehicles.

Generally speaking, the ground pressure of wheeled vehicles rises significantly with the platform's weight. In the case of tracked vehicles this correlation is not as evident. In light of this, the renowned British tank expert Ogorkiewicz has argued to abandon concepts of wheeled combat vehicles weighing significantly over 22-23t. Even a multiwheeled configuration (8x8 – that is, eight powered wheels) with variable tire pressure can not solve the problem – resulting only in a very complex, hence expensive, design.

This is a principal matter: it is difficult, if not hopeless, to conceive of technological solutions that could radically solve the problem of wheeled armor's relatively high ground pressure. (And we certainly should not contemplate resurrecting the failed 'solution' attempted during the 1920s and 1930s, which was to equip wheeled vehicles with auxiliary tracks.)

Although wheeled armored vehicles cannot escape their principal dilemma, there have been some interesting and worthwhile examples of such platforms in the 20-30t weight range. One is the South African mechanized howitzer, RHINO, with a weight as high as 36t. Several other vehicles of interest, mostly in the experimental or blueprint stage, may achieve around 30t – for example, the new British/Dutch/German infantry carrier. But the willingness of advanced militaries to invest in such vehicles does not mean that Ogorkiewicz' concerns are being over-turned. These programs do not indicate a belief that wheeled armored vehicles could generally be heavier than he argues and still exhibit good cross-country performance. Instead, in most cases, the fielding of heavier wheeled vehicles reflects special, limited circumstances or goals.

- In two cases, the South African RHINO and the Czech/Slovak DIANA/ZUZANA, the vehicles in question are mechanized artillery. For these, tactical mobility is not a high priority. They are wheeled because the resulting operational mobility facilitates the flexible allocation of fire a key concern for artillery.
- In the cases of France, Germany, and some other nations, military planners and designers appear to have deliberately down-rated soft-terrain capabilities. This probably has to do with increased emphasis on peace support and peace enforcement missions, which

also put a premium on operational mobility for vehicles of relatively high payload.

Turning to the question of agility: Wheeled armored vehicles tend to excel in speed – on the road, of course, but also in open terrain, if it is fairly negotiable. When it comes to zigzagging and acceleration, the advantage also seems to go to wheeled armor. It is true that most tracked vehicles can pivot in place, while wheeled vehicles cannot (except for those with brake-steering). Otherwise, however, wheeled vehicles are more easily steered and their running gear is more responsive. Compared to a tracked counterpart of equivalent weight and engine output, we can expect a wheeled platform to have not only higher speed, but also better acceleration. Interestingly, these advantages are especially pronounced with respect to relatively light armored vehicles. It is plausible that high agility is associated with 'smallness' and 'lightness'.

Tactical mobility has another important precondition: protection. As one legendary expert, General Israel Tal, has argued: Without proper protection even the most agile and cross-country capable vehicle could not move forward in harm's way. We will deal with protection and survivability in the following section. Suffice to say for now that there is a dialectic interplay between tactical mobility (in the narrow sense) and protection that is relevant to the challenge of moving under fire.

# 3 Survivability and protection

If strategic and operational mobility contribute to the capacity to locally overwhelm an opponent then they certainly also contribute to the survivability of the superior force. The same can be said of tactical mobility: as evasive tactics tend to neutralize the impact of hostile action, they indirectly contribute to survivability. Survivability is further enhanced if the weaponry of the platforms in question makes it possible to fire from detached positions – so that the platforms cannot be easily detected or shot at. All these systematic interactions are important, but the discussion of survivability usually centers on protection. Of course, protection itself is a complex matter. It can be achieved through active and passive measures as well as by the reduction of a vehicle's signature (stealth).

# 3.1 Active protection

The active protection of armored vehicles was already being pioneered by the Soviet Army in the 1970s. It was regarded as necessary to compensate for perceived weaknesses in the armor of Soviet main battle tanks. Although the work started more than two decades ago, systems ready for field use did not appear before the 1990s.

Active protection involves soft- and hard-kill techniques. Soft-kill methods aim to divert incoming guided missiles to a non-lethal path using, for instance, anti-laser smoke or infrared jammers against an anti-tank-guided weapon's guiding system. Hard-kill methods aim to destroy guided and non-guided missiles, including shoulder-fired rockets, close to their target. A typical hard-kill technique employs a radar-controlled array of small fragmentation-grenade launchers.

The implementation of such systems is not 'design-dependent' – that is, it does not matter whether they are mounted on a tracked or a wheeled vehicle. However, in the case of hard-kill systems, which weigh considerably more than soft-kill ones, it is advisable to put them on vehicles heavier than 25t. Only above 25t does their weight, which is more than 1t, become negligible. Interestingly, the advent of such techniques has already provoked the development of effective countercountermeasures. Anti-tank missiles are being made stealthier and the Russian Army has been field-testing a tank destroyer firing two missiles in a very short sequence (for defense saturation).

In light of the techniques developed so far – and there are no fundamentally different approaches in sight – active protection suffers some inherent or principal problems in compensating for increasingly important armor vulnerabilities. There is no recipe for dealing with high-velocity armor-piercing rods fired from heavy tank guns. Nor is there anything these active systems can do to defeat machine cannon, whose caliber and role has been increasing in modern armies. This is because the respective projectiles are simply too fast, too powerful and, in the case of machine cannon, too numerous.

# 3.2 Passive protection

When we consider the full spectrum of threats to vehicles there seems to be no viable alternative to armor protection proper. And since the 1970s there have been quite a few innovations in this field. First, the development of Chobham (sandwiched) armor in Britain and, soon after, the evolution of "reactive" armor in the USSR and Israel.

Reactive armor can be added to a vehicle's armored skin. It consists of explosive elements designed to neutralize incoming (guided or unguided) missiles equipped with shaped charges. Currently there is work in progress to even deal with kinetic energy projectiles (rod penetrators fired from guns). These cannot be neutralized, but they probably can be rendered somewhat less harmful.<sup>3</sup> For reactive armor to be optimally effective a rather solid embedding is needed, which rules out vehicles much below 30t. And most experts agree that, in addition to reactive armor's limitations with regard to kinetic-energy projectiles, there remains considerable vulnerability to tandem charges and saturation attacks. In sum, reactive armor can only be an add-on, applied temporarily in high-threat scenarios and in situations where the weight of the respective vehicles does not matter too much.

In the end what counts is the strength of a vehicle's skin. And, indeed, there continues to be a direct correlation between volume and weight of armor on the one hand and the level of direct protection on the other. At present, there are no known technologies that promise a realistic alternative within the next two decades.

British tank designers have been hoping to develop a future MBT (project MODIFIER) with a weight of less than 50t (and probably only 40t) but with considerably better protection, firepower, and automotive characteristics than current 65t monsters. However, the leading German tank expert Rolf Hilmes, estimates that if the British stick to their specifications, they will end up with a 70-75t vehicle. By contrast, Israeli tank

<sup>&</sup>lt;sup>3</sup> The idea is to rapidly accelerate metal plates (by explosives or electromagnetically) in the direction of the in-coming projectiles. Thereby passive armor becomes nearly active. At the moment it is an open question whether or not this approach is really promising.

designers accept an MBT concept implying a weight of well over 60t. They place special emphasis on all-round protection because they are planning not only for warfighting scenarios, but also for peace enforcement and counter-insurgency contingencies, which are more likely to expose vehicles to threats from all sides. This is one reason that the MERKAVAH-series tanks have a frontal power pack; it allows for additional armor for flank and rear protection.

In Germany the cautious hope is that the future generation of main battle tanks can be confined to a weight not much more than 50t. Unlike the British, German expectations are rather modest: The Germans are aiming for some improvements in armor protection, greater improvements in firepower, but no advance in tactical mobility over the LEOPARD 2. It is noteworthy that the Germans are also planning for a new mechanized infantry combat vehicle (MICV) that is supposed to be fielded from 2008 onwards; considerably earlier than the next generation MBT (if this would come at all).

The vehicle is being conceived to have adjustable armor with modular packs to be added according to threat. Minimum weight is to be 32t and maximum weight in excess of 40t which makes riding on tracks imperative. With the addition of active protection measures this vehicle is expected to have almost the protection level of an MBT; a prospect that is disputed by a number of German armor experts. In the view of these critics sufficient protection against mines, shoulder-fired (nonguided) missiles, and machine cannon of medium caliber (30-40 mm) implies a MICV weighing 50t or more.

Of course, this level of protection is simply not available to wheeled armored vehicles, due to weight limitations. The South African 28t ROOIKAT (with a crew of four and, therefore, more compact than the future German MICV with at least 9 occupants) is frontally protected only against 23 mm-machine weapons! It is unrealistic to expect wheeled armored transport vehicles of 20-25t to have protection against anything more powerful than infantry weapons up to heavy machine guns – 12.7 mm to 14.5 mm – (with protection against the latter only in the frontal arc).

Paradoxically, almost the same level of armor protection is possible in the weight class below 10t. The Swiss EAGLE I of 4.8t (an armored HUMMER variant) is proof against 7.62 mm hard-core bullets fired from as close as 100 m, and the German-Dutch FENNEK (10t) can be frontally protected against heavier machine guns if a fraction of its sizeable payload is used for additional armor). The reason is that these vehicles are far more compact than the armored 'buses' of 20t or more, due to smaller crews and a less voluminous running gear (heavier wheeled armored vehicles need 6x6 or 8x8 configurations, while lighter ones can do with 4x4).<sup>4</sup>

Six-by-six and eight-by-eight configurations do have an advantage, however: they are somewhat more robust with regard to mine damage. If one or two tires are destroyed the vehicle can still limp back to base. This would be impossible for a 4x4 vehicle. (In the case of a tracked vehicle, mine damage to a track also incurs instant immobilization.) Modern sensor-triggered mines are not exclusively directed against tracks or wheels, however, but against the whole bottom of a vehicle. Relying on clever design, some relatively small and light armored wheeled vehicles can achieve an 'under-belly' protection level superior to that of much larger and heavier vehicles. A good example is the new South African-inspired German personnel carrier (ATF). It carries 5 occupants and weighs 8t, and is reported to have substantially better mine protection than the much larger FUCHS (6x6) with its crew of 12 and weight of nearly 20t.

#### 3.3 Affecting the signature

If one vehicle is more compact than another, its chances of not being seen and, if seen, of not being hit are greater.<sup>5</sup> In the past, wheeled armored vehicles – especially those with a multi-wheel, rigid beam-axle running gear – tended to be considerably less compact and, in particular, significantly higher than tracked vehicles of similar weight and purpose. This has changed significantly. Due to the introduction of

<sup>&</sup>lt;sup>4</sup> Wheeled armored vehicles in the 15-25t bracket are often used for infantry transport.

<sup>&</sup>lt;sup>5</sup> While compactness is helpful, 'over-compactness' is not. As some negative Soviet experience shows: drastic reduction in the size of a vehicle is likely to result in insufficient sub-system redundancy – hence vulnerability.

advanced running-gear features (such as power trains with Hconfiguration and trailing-arm suspension) the difference in compactness and height has been reduced. However, with the advent of dieselelectric drive systems the potential exists for making tracked vehicles even more compact.

Whereas in respect to signature wheeled and tracked vehicles will be almost on a par, there is another aspect in which the former will always be superior to the latter: Due to reduced friction and rolling resistance the acoustic signature of wheeled vehicles is much smaller.

#### 4 Firepower

Some wheeled armored vehicles in the 25-30t class are equipped with 105 mm guns – for instance, the Italian CENTAURO and a variant of the ROOIKAT. And this arrangement works. A German experimental wheeled vehicle weighing slightly over 30t is reported to have been successfully equipped with a 120 mm gun! However, in this case, doubts about the platform's stability are unresolved. This indicates that we may be reaching a design limit. In this light, the prospect of mounting the next generation powder gun (140 mm) on a wheeled vehicle should be regarded as totally illusory. Given the firing impact of this gun and the armored volume needed, the platform may have to weigh 50t or more.

Much hope is being invested in the development of powerful electromagnetic guns, with efforts underway in a number of countries including Britain, Germany and the United States. Such weapons (of the rail-gun or coil-gun approach) could be lighter than contemporary powder guns and convey much less impact to the firing platform. But the related facilities for storing and generating energy are estimated to have a volume in excess of 5 cubic meters (without high performance cooling and other periphery). For comparison: 32 rounds of 140 mm ammunition need about 3 cubic meters. Thus, all told, it is not likely that an electromagnetic-gun tank could be very compact or particularly light. Lightness could only be achieved if one accepts unarmored volume. It is presently impossible to confidently estimate the final weight these developmental systems will achieve. Nonetheless, it is difficult to imagine the eventual product being light enough to ride on wheels.

The firepower story is different for mechanized artillery platforms, however. As noted above, there presently are two examples of series-produced and successfully-fielded wheeled armored howitzers (152/155 mm). Firing such heavy weapons does not cause serious problems since this is not being done on the move, but from a halt position (and, if need be, with the aid of hydraulic stabilizers). Of course, the tactical mobility of such vehicles is quite limited. However, because firing takes place at stand-off distances, this handicap has been acceptable. The same applies to armor protection. Its relative weakness may also be justifiable because direct enemy contact is normally avoided and avoidable. (It would be advisable, however, to employ some add-on elements of reactive armor to protect against top attack by indirect fire.)

A final point: although wheeled armored carriers are not really suited for being equipped with very powerful weapons for direct fire, they might be able to do a better job than their tracked counterparts when equipped with lighter weapons, such as machine cannon and recoil-free missile launchers. This is because the running gear of wheeled vehicles has a 'pre-stabilizing', softening effect. Firing lighter weapons on the move should normally be easier from a wheeled platform than a tracked one.

# 5 Costs

Wheeled armored vehicles used to be cheaper than their tracked counterparts. They were simpler and made more use of relatively inexpensive parts or sub-systems (such as engines and tires) from largeseries civilian production. Things have changed. Wheeled armored vehicles, especially the large, multi-wheeled ones, have become more sophisticated and 'militarized'. As a result, the former advantage with respect to procurement costs has disappeared – with the notable exception of some very light and compact wheeled armored carriers.

Wheeled vehicles enjoy another cost advantage, however: They tend to be less expensive to operate. As noted above, they travel farther
than tracked vehicles for the same quantity of fuel. And maintenance requirements also are less burdensome – provided that most of the vehicles' travel is on roads and not over soft or rugged ground.

### 6 Composition of future intervention forces

In light of the previous considerations, we can ask: what mix of platforms would best serve the purposes of the ground-mobile element of future intervention forces? To answer this question even minimally we must first specify the military functions that the force will perform, which derive from its likely missions. The present interest in developing a 'broad-spectrum' force implies a roster of activities or functions that encompasses those relevant to traditional warfighting as well as those that are key to peace missions. In brief overview, the likely functions of the intervention force would include:

a) attack or counter-attack on centers of gravity,

b) extrication of friendly forces under optimal protection,

c) the beefing-up of escorts that are marching with humanitarian convoys through high-threat areas,

d) containing and resolving pockets of resistance in the context of peace enforcement,

e) the routine escort of humanitarian convoys,

f) the routine protection of humanitarian sanctuaries,

g) the beefing-up of sanctuary defense,

h) cavalry screens (to cover the movement of other forces), delaying actions, and pursuit,

i) general reconnaissance,

j) target acquisition and designation for indirect fire,

k) protection of secondary axes and the conduct of initial defense,

1) area control and demonstrations of interest,

m) urban warfare,

n) indirect fire to assist in a), g) and k) as well as for follow-onforces attack and to stop enemy breakthroughs.

This set of activities and functions would be optimally covered by having three families of vehicles:

- ~ A heavy family that would be mainly in charge of a), b), c), and d) and, to a lesser extent, g) as well as m). Its vehicles should be relatively heavy (around 50t) and, consequently, tracked. Typical examples would be a main battle tank utilizing new technology and a MICV with especially good protection.
- The medium family might consist of only one basic wheeled platform (8x8) whose different variants (weighing 25-35t) would carry heavy tube artillery, a multiple-launch rocket system, and/or a fiber-optically guided missile array. Its main function would be n), of course. In performing this function it would assist in a), g), k) as well as in follow-on forces attack and in stopping enemy breakthroughs. Emphasis would be placed on ensuring optimal fire allocation, which requires good operational mobility.
- The light family (4x4) would have relatively many members. There should be special versions for reconnaissance (equipped with machine cannon), infantry transport, an anti-tank missile system, shorter-range indirect fire (mortar), and an air defense missile system. All vehicles of this class should be very compact and relatively light (5-9t). They should have acceptable ground pressure (to allow movement over soft ground) and a high degree of agility. Compactness and agility would enhance their survivability. This would be combined with unrivaled operational and strategic mobility. The main functions to be performed by the light family are e), f), h), i), j), k), l); secondarily, it would serve m) as well.

Cautionary note: The variables 'low weight' and 'compactness' imply that the infantry carrier belonging to the light family cannot have more than 5 to 7 occupants. This would suffice for patrolling missions, but in a warfighting scenario the vehicle's crew may be too small to form a viable tactical entity. However, the currently common practice of loading 10, 12, or even more soldiers into a large 15-25t wheeled carrier puts 'too many eggs in one basket'. This is especially worrisome because large multi-wheeled vehicles are particularly vulnerable.<sup>6</sup> For this

<sup>&</sup>lt;sup>6</sup> In the context of modern non-linear battlefield scenarios, and especially when troops are engaging in peace enforcement, threats are likely to come from all sides and may not wait until the unit has arrived 'at the front'. Bulky vehicles have

reason, the small-crew/compact-vehicle approach demands further study. One possibility would be to team pairs of vehicles closely together.

One system obvious by its absence in this schema is an Armored Gun System (AGS). As already mentioned, relatively well-armed gun carriers are available in the 20-30t class of wheeled vehicles. However, for reasons explored above, the survivability of these platforms in a tank role has to be rated rather low – especially if an AGS is expected to confront a 'real' main battle tank. The same proviso applies to tracked tanks in this weight class. A small, agile, and compact wheeled missile carrier is likely to do a better job.

In conclusion, if a ground force is to optimally execute a broad spectrum of activities, while also achieving a relatively high degree of strategic and operational mobility, then it should have a differentiated mix of heavy and lighter forces. General Shinseki's vision of a capable full-spectrum all-wheeled ground force is not likely to be realized in the time-frame imagined, i.e. 15 years. The present trend of technological development offers little hope for the emergence anytime soon of a medium-weight wheeled vehicle with sufficient protection to confidently undertake the most demanding and dangerous of combat missions.

The alternative concept of a heavy-medium-light mix, although at odds with the General's vision, would still enhance strategic mobility very substantially. In some respects, it might achieve more in this regard than Shinseki's model. *The bulk of the forces would be in the light class* – ideally suited for long-distance, rapid deployment. Along with the medium-weight assets of indirect fire they could be used to quickly stabilize a situation. Of course, when the going gets tough, the heavy element becomes indispensable. But it might arrive somewhat later without compromising the campaign, as the historical experience of the Second Gulf War shows. There is no principal reason why intervention forces should not travel in batches.

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become increasingly vulnerable – not only when they get into a jam, but also on operational marches.

tives Briefing Report No 16, Cambridge, MA, 2000.

#### Bibliography

Bonsignore, E.: "Russian Tank Active Defence Detailed", *Military Technology*, 8/1993, pp 70-71.

Faller, E. and H. Stichnote: "Elektrische Energietechnik für Rad und Kette", *Wehrtechnik*, 11/1993, pp 56-61.

Hilmes, R.: *Kampfpanzer: Technologie heute und morgen* (Frankfurt am Main: Report, 1999).

Hilmes, R.: "Minenschutz bei militärischen Landfahrzeugen", *Soldat und Technik*, August 1999, pp 469-473.

\_\_\_\_\_\_: "Gepanzerte Radfahrzeuge im Aufwind", *Soldat und Technik*, March 2000, pp 153-160.

Kosar, F.: "Wheeled Armoured Reconnaissance Vehicles", Armada International Special, II/1984, pp 36-56.

Meyer, T. J.: "Active Protective Systems", *Armor*, May-June 1998, pp 7-11.

Ogorkiewicz, R.M.: "Wheels or Tracks?", International Defense Review, 8/1986, pp 9-16.

: "In Search of Lighter, Smaller Electric Guns for the Future Tanks", *Jane's International Defense Review*, 2/1999, pp 26-31.

Pengelley, R.: "Focusing Firepower for the Future", *International Defense Review*, 6/1998, pp 44-52.

Schwartz, W.: "Explosive Reactive Armour", *Military Technology*, 8/1991, pp 57-63.

Senger und Etterlin, F. M. von: *Taschenbuch der Panzer 1983, Tanks of the World,* Translation by R. Simpkin (Munich: Bernard & Graefe, 1983).

Sharoni, A.H., and L. D. Bacon: "The Future Combat System (FCS)", *Armor*, July-August 1997, pp 7-15.

Wessels, G.: "Neue Gepanzerte Plattformen", *Soldat und Technik*, May 1997, pp 305-306.

### Addendum

Since the first publication of "Wheels or Tracks" we have witnessed the evolution of several trends that are about to substantially affect the choice of platforms for military commitments on the ground. These trends can be described as follows:

Due to the impact of contemporary intervention scenarios the need for a proliferation of wheeled platforms for swift, wide-area patrol missions has been increasingly accepted in military circles. Planning for – and procurement of – such vehicles in the bulky 6x6 and 8x8 classes goes on. At the same time there has been a veritable surge of new models, with respective appropriations, in the 4x4 class.

As demonstrated above, vehicles in the 4x4 class do have the potential to be very compact and particularly mobile. To some extent these advantages are being taken away, however. There has been a reduction in both compactness and tactical mobility. The vehicles in question have become clumsier and heavier – easier to hit and more or less confined to road travel.

The current military consensus demands that these platforms, even if originally conceived as 5-seaters, should be able to transport 8 soldiers for dismounted duty (plus crew). Experiments with smaller complements in tactical pairs appear to be tabooed.

The demands on armor protection have increased continuously: Western expeditionary forces are facing a more serious threat. Whereas previously the threat consisted mainly in mortar attacks, mines, shoul-der-launched grenades, and fire from sniper rifles as well as large-caliber machine guns, there now appears to be an additional, quite effective challenge: Improvised Explosive Devices (IEDs) are used more often than ever before. These – often remote-controlled – makeshift roadside bombs often contain so much explosive that all kinds of vehicles – say – below 30t, or even 40t, would be in trouble.

If one wants to maintain some flexible, 'omnipresent' patrolling capacity, it is advisable to do as best as one can with respect to lightweight armor protection, while preserving at least some off-road agility and not putting 'too many eggs in the basket'. The alternative would be to go back to a general pattern of 'big and heavy': raising questions of affordability and military feasibility. All over the world plans for revolutionary new MBTs (with electromagnetic guns, for instance) have been shelved. There are simply no plausible scenarios for such ventures. To most armies, it seems sufficient to submit current-generation MBTs to programs of life extension and adapting them to counter-insurgency missions. Quite a few of these MBTs, or other heavy platforms, may be reconfigured as very heavy infantry carriers (developments in Israel, Jordan, and the Ukraine): thus fitting in with modern tasks such as the evacuation of hostages or protected infantry assaults on strongholds.

Finally, a few remarks on active protective measures! Apparently, some progress has been made (H. J. Wagner: "Abstandsaktive Schutzsysteme", *Strategie und Technik*, June 2007, pp 32-41). There are several promising developments especially in Russia, Israel and Germany. But only a very limited number of systems has actually been fielded.

With respect to the hard-kill approach it should be noted that relevant systems are now somewhat lighter and more compact than previous ones. And – surprisingly – they can also tackle kinetic energy rods, but remain quite expensive and may still be overcome by saturation tactics.

Soft-kill techniques ("jamming") have assumed new importance as they offer themselves as a means to neutralize remote-controlled IEDs.

# ROTOCRAFT FOR WAR, PART 1 DESCENDING ON A MILITARY DILEMMA

#### 1 Magic machine

To begin with obvious qualities: helicopters make a hell of a lot of noise, mainly due to the aerodynamics of their rotor blades. So they always announce their approach – whether to guerrilla bands who seek to evade them or to reception committees who are awaiting the arrival of a heliborne dignitary. This is counterproductive in the former case, quite helpful in the latter.<sup>1</sup>

Another obvious quality of helicopters is their fantastic mobility. Able to pluck riders from nearly any spot and deposit them to nearly any other, they provide a flexible, albeit expensive, mode of transit. This unique quality has contributed substantially to making rotocraft a V.I.P. status symbol. Their noise plays a part too, drawing attention to the comings and goings of the rich and powerful. Especially in the United States, helicopters have become both common features of every day life and signifiers of glamour and clout.

Hollywood, too, has contributed to the celebrity of this machine. Cast variously as the sky-taxi of tycoons, airborne spy platform, flying escape car, and consummate fighting machine, the helicopter is a special-effects star. When scripts demand it, helicopters can even magically

<sup>&</sup>lt;sup>1</sup> There have been numerous attempts to render rotocraft somewhat quieter, ranging from electronic counternoise (for noise neutralization) to mechanical improvements. The best solution so far appears to be the concept of flexible fiber-glass rotor blades connected to a hingeless rotorhead (as pioneered by the German Bo 105). But even this approach results in only a modest reduction of noise.

dispense with their noise and gain the capacity to appear unexpectedly from behind a hill or building to suddenly transform the dramatic action – but only in the movies.

All this cultural imagery acts on us. It is mentioned here in order to dispense with it. The issue for war-fighters and defense planners is the usefulness of helicopters in real combat. To address this, we need to peel away the cultural distortions and work our way back to a true picture of operational capabilities.

### 2 Fundamental features

Although able to go almost anywhere, helicopters have several significant disadvantages when compared with fixed wing aircraft of the Conventional Take-Off and Landing (CTOL) type. These disadvantages mainly stem from the fact that, for helicopters, a single mechanical element – the rotor – provides both lift and forward thrust. By contrast, CTOL planes benefit from an ingenious and economical division of labor: propellers or turbines provide thrust; profiled fixed wings, when exposed to horizontally streaming air, provide lift. Among the comparative disadvantages of the helicopter are its:<sup>2</sup>

- Limited speed: Due to the aerodynamic characteristics of rotating rotor blades (their tips approaching the sound barrier) helicopters cannot travel faster than about 350 km/h. Since operating rotocraft close to their physical limits is hazardous, most helicopters have been built to reach speeds of 250-300 km/h at the most.
- Limited service ceiling: In general helicopters cannot reach altitudes much higher than 7,000-8,000 m. For fully loaded combat helicopters (especially armored ones), maximum ceilings are even lower. This does not seem to constitute a major handicap to military helicopters because they are often used in Nap-Of-the Earth (NOE) operations. Issues of survivability dictate this mode of flying

<sup>&</sup>lt;sup>2</sup> The US Marine Corps has attempted with their V-22 Osprey to combine the main talents of the helicopter and CTOL planes (VTOL and better speed/load characteristics). However, due to technological over-complexity, costs are high for this cross-breed (2001: about \$47+ million per copy) and reliability is low.

due to the speed limitation of helicopters, noted above. Flying high in combat increases exposure, facilitating detection and targeting. At slow speeds such a profile would render the chances of survival rather low. In mountain warfare, especially, the limited service ceiling of helicopters can be quite frustrating, however. Although they can take off from terrain as high as 4,000-5,000 m, they must do so with considerably reduced loads.

- Limited range/payload/armor protection: Compared with CTOL planes the fuel consumption of rotocraft is not very economical. This worsens the trade-off between range and payload: if range is a high priority, it forces a strict limit on payload (including armor protection). In-flight refueling could offer a way out of this dilemma, but it would have to occur relatively often and this would entail its own particular hazards and complications. In-flight refueling of helicopters has not become common, because combat helicopters are mainly used in tactical or, at most, operational roles which implies ranges that make in-flight refueling impractical.
- High cost: Rotocraft are extremely expensive machines. Due to their remarkable complexity they may well cost many times more than CTOL planes of similar speed and payload – with respect to both procurement and operations.

Noise along with speed and load limitations contribute to helicopters being relatively vulnerable machines in general; the relevance of load limits has to do with capacity for armoring these craft. Partly compensating for its high degree of vulnerability is the helicopter's relative agility – its capacity for quickly changing direction, which among other things makes possible the aforementioned NOE operations.<sup>3</sup>

Another set of measures intended to overcome the helicopter's characteristic vulnerability come under the rubric of stealth. As demonstrated by the US Army's RAH-66 Comanche, a helicopter today can be given a low-signature fuselage (with internal weapons bays) and heat

<sup>&</sup>lt;sup>3</sup> One of the disadvantages of such operations is, however, that persons to be transported (such as infantry) often arrive at the zone of engagement seriously 'air-sick', incapable of fighting.

(infrared) suppression that is much better than in previous designs – if one is willing and able to bear the cost (about \$30 million per unit). Also, rotor systems can be designed to generate somewhat less noise. It remains to be seen in practice, however, whether it is possible to significantly reduce the radar echo of a rotor in motion. Here there are difficulties of a more fundamental sort.

### 3 Some scenarios

An empirical analysis of how helicopters have figured in past war scenarios and actual conflicts can provide a basis for evaluating their prospective future roles. Roughly put, the past uses of helicopters in a military context fall into three broad categories: auxiliary functions, single-arm combat use, and combined-arms combat use.<sup>4</sup>

### 3.1 Auxiliary functions

Liaison: Typically this entails flying military leaders or relevant specialists from one unit or headquarters to another. In quite a few cases CTOL planes would be equally adequate for such tasks and perform them at much lower cost. However, in modern armies light CTOL planes have become a scarce commodity. Status issues may play a part in this. (Perhaps commanders find it appealing to descend rather divinely on their troops.)

Evacuation of casualties and Search And Rescue (including Combat SAR): For these missions, helicopters have proven indispensable. It is the near-ideal machine for these tasks.

Reconnaissance, target acquisition and designation: Relevant activities range from (i) a commander's rather spontaneous surveillance flight ('just to get an overview') to (ii) general reconnaissance conducted by a dedicated force element to (iii) very demanding missions carried out by special units organizationally and/or electronically linked to combat

<sup>&</sup>lt;sup>4</sup> Maritime uses of rotocraft have been excluded here.

formations (of attack helicopters or artillery etc).

But only portions of these activities really require the use of helicopters. Again, light CTOL planes could often substitute – and in relatively austere armies, they do. The US Army's almost exclusive emphasis on helicopters in these roles reflects its institutional settlement with the US Air Force over turf issues. At any rate, this class of tasks has been proven to be extremely important. If carried out in an optimal manner, the benefit to combat units can hardly be over-estimated. But optimization typically implies 'networking' – a synergetic division of labor with other, probably unmanned, recce platforms.

Transport of goods and troops from a secure base to an uncontested target area: When road transport is not an option (due to time constraints or because the land routes are impassable), helicopters often do an excellent job. This is especially true when there are no landing strips for CTOL planes in the target area. When the impassability of land routes has to do with hostile action in the territory between the mother base and the landing zone, helicopter gunships may need to escort utility and cargo helicopters in order to pre-empt and suppress fire from the ground.<sup>5</sup>

#### 3.2 Single-arm combat use

In the final phase of the Second Gulf War US Army's Apache helicopters (AH-64), guided by USAF MH-53J Pave Low helicopters, served as mobile and very flexible platforms for launching high-precision Hellfire missiles at vital points of the Iraqi ground defense in Kuwait, such as air defense sensors and communication nodes. These attacks, which preceded the coalition's counter-invasion, were mainly conducted from the FLOT (Forward Line Own Troops) and involved only a limited number of rather shallow, mainly night-time penetrations of Iraqi-held territory. (Other, more complex combat helicopter operations during the Gulf War are examined below in section 3.4.)

Another interesting example of single-arm combat use is the

<sup>&</sup>lt;sup>5</sup> If the rotocraft employed are rather large and if ordinary infantry is being transported, evasive tactics may have particular limitations.

employment of helicopter gunships by the Israeli defense forces during the second Intifada in Palestinian territory. Again combat helicopters have been used as a type of flying high-precision artillery. In this case they fired missiles in an uncontested sky at hostile sniper strongholds from beyond their opponents' reach.

Such single-arm uses of combat helicopters appear to be quite effective. Its defining feature is that helicopters are used in a stand-alone manner, rather than as part of a combined-arms operation, and not in large formations. These single-arms operations do evince a reluctance to employ helicopters over enemy-held areas. Typically it is preferred to confine these precious machines to operations from behind or along the FLOT.<sup>6</sup> Penetrations of hostile land are limited to helicopters like the Apache that have substantial armor protection and superior nightvision equipment (which allows them to fight at night). Even in the case of using the relatively well-protected Apache over enemy-held territory, US Army doctrine dictates generous missile artillery preparation of their avenues of approach.

#### 3.3 Combined-arms combat use

During the second half of the Vietnam War relatively compact utility helicopters were linked in operations with the first dedicated helicopter gunships. The utility helicopters (UH-1) carried troops and often also a mix of machine guns and rocket launchers for the suppression of hostile fire. The gunships, sporting very effective machine cannon and also rocket launchers, provided additional, concentrated fire support. The flying formations tended to be large, often comprising many dozens of machines.

The doctrine for the use of these formations appeared to call for a particularly swift allocation of troops and firepower to crisis spots, culminating in aggressive action by dismounted heliborne infantry, supported with suppressive fire from the machines hovering above,

<sup>&</sup>lt;sup>6</sup> This approach is quite similar to the tactical doctrine of the German Bundeswehr's fleet of light anti-tank helicopters (Bo 105) during the last decade of the Cold War: Dashing up to the FLOT (to prevent Soviet breakthroughs), but never crossing it!

which also could evacuate the entire ground force quickly in case of disaster.

This approach has fundamental shortcomings, however:

- Amassing large helicopter formations combined-arms-style involves many people and requires a long phase of preparatory planning. It also entails a major maintenance and supply effort. The quantity of machines involved multiplies the demands imposed by their complexity. The preparation requirements increase an enemy's chances of obtaining some early warning. More generally, the time required for planning and preparation increases the likelihood that conditions will change at the target site before the force can be brought to bear. The substantial support requirements also can lead to the creation of large, hence vulnerable, mother bases.
- In actual combat the helicopters troopships and gunships alike are deprived of their principle tactical asset: agility. This is because they are tied, more or less, to slow-moving foot infantry for whom they provide essential fire support and evacuation capacity. This tethering makes the helicopters rather easy targets.

The US Army was not alone in employing this general type of formation and operational concept. The Soviet Army had a similar practice in Afghanistan, which also entailed significant risk. In Vietnam, 2,112 US helicopters (of all services) were lost to enemy action. Total helicopter losses were 4,587. The Soviets deployed far fewer helicopters to Afghanistan – estimates of the total number deployed at any one time after 1980 range from 300 to 500+. Total losses during eight years of action were quite high: probably more than 300, which suggests that the entire force may have had to be replaced!<sup>7</sup>

<sup>&</sup>lt;sup>7</sup> Gen. (Ret.) M. Y. Nawroz, Army of Afghanistan, and L. W. Grau: The Soviet War in Afghanistan: History and Harbinger of Future War? (Fort Leavenworth, Kansas: Foreign Military Studies Office, 1995); M. Allen: Military Helicopter Doctrines of the Major Powers, 1945-1992: Making Decisions About Air-Land Warfare (Westport, Connecticut: Greenwood Press, 1993); A. Cordesman and A. Wagner: The Lessons of Modern War, Volume 3, The Afghan and Falklands Conflicts (Boulder: Westview Press, 1991); and M. J. Armitage and R. A. Mason: Air Power in the Nuclear Age (Urbana: University of Illinois Press, 1983).

# 3.4 Case study: combat helicopters in the Second Gulf War

The US Army deployed 274 Apaches to the 1990-1991 Gulf War in fifteen battalions/squadrons. According to the US General Accounting Office (GAO) these flew more than 34 attack missions and 36 armed reconnaissance missions, each involving multiple helicopters. These missions comprised less than 700 sorties – each sortie being a flight by one aircraft. (All told, coalition air forces flew 112,000 sorties during the war; of these, about 67,000 were combat-related.) Total US helicopter losses during the war were five combat-related and 18 non-combat. US fixed-wing aircraft losses were 37 combat-related and 15 non-combat.

In addition to the single-arm combat uses mentioned in section 3.1 helicopters also functioned in more complex ways during the Second Gulf War. These included missions in which various types of helicopters cooperated to conduct deep assaults into Iraq and operations in which helicopters cooperated with ground units to attack Iraqi formations. Several operations involved one or more battalions of attack helicopters and one involved a rotary-wing armada of 200 aircraft. And yet, despite their size and scope, these uses did not transcend the limitations suggested in previous sections. To see why, a brief review of some of these Gulf War 2 combat helicopter operations is necessary.

Prior to the onset of the ground war, Apache battalions conducted armed reconnaissance raids on Iraqi positions to reduce their resistance and clear attack and supply routes for coalition ground forces. These mostly occurred along the outer rim of the main battle area where the XVIII Airborne Corps and French forces operated. Once the ground war began in earnest large helicopter operations occurred west of Kuwait, in Iraq proper, as the US 82nd Airborne (cooperating with the French 6th Light Armored Division) and the US 101st Airborne division moved to screen the main coalition ground forces (which lay to the East) and to interdict Highway 8 to the north.

Especially impressive was the movement of the 101st Airborne. This involved 200 helicopters, 1000 vehicles (some airlifted along with artillery), and 6000 soldiers. In an operation taking 35 hours the 101st Airborne first established a forward operating base (Cobra) 100 kilometers inside Iraq and then seized positions astride Highway 8 another100

kilometers farther north. Notably, the Iraqi military presence in these areas was sparse. (A condition also true farther to the west where the 82nd Airborne and French forces operated.) The low density of enemy troops facilitated the move by the 101st Airborne and allowed its forward operating base to be linked to the rear by a relatively secure land supply route.

Later in the war attack helicopters from the 101st joined with others from the US 12th Aviation Brigade to establish a second operating base (Viper) farther east from which they could attack Iraqi forces trying to exit Basrah on their way north. Four Apache battalions – 72 aircraft – worked in unison to destroy almost 100 military vehicles and weapon systems within four hours. However, this pace of activity put a severe strain on supplies of ammunition and fuel. Although supply helicopters worked feverishly to bring supplies forward, the problem was not relieved until a ground convoy reached the new operating base at nightfall.

The attack helicopters of the US 24th mechanized division and those in VII Corps worked somewhat more closely with ground maneuver units. The 24th mechanized division and the divisions of VII Corps formed the inner rings of the coalition force and their Apaches engaged denser Iraqi formations. For instance, eighteen Apaches of the 11th Aviation brigade attacked the 10th Iraqi division 50 kilometers ahead of VII Corps. The assault successfully destroyed about 100 vehicles – but the targeted Iraqi division was already exhausted when the assault came. The residual elements of the 10th and other Iraqi divisions were in the mood to flee, not fight. Many Iraqi vehicles were destroyed from 2000 meters distance as they moved in convoy.

The Apaches of the 11th Aviation brigade might have claimed even more Iraqi assets had the assault not been delayed due to the danger of fratricide. Reducing these dangers required coordination between the Apache units and the numerous friendly ground units over which they had to pass. The delay allowed some Iraqi vehicles to move into a zone that was the responsibility of coalition fixed-wing aircraft. Apaches were not allowed to operate in this zone even though the attacks by fixed-wing aircraft – F-111s using laser bombs – were not sufficient to stop the masses of fleeing Iraqi vehicles. As it turned out, coordination between the two air arms was insufficiently flexible to allow better integration. This is a persistent problem that was still complicating operational planning eight years later in the Kosovo war.

Closer coordination between Apaches and ground units was attempted during the US 1st Armored Division's battle with the Republican Guard Medina division – the largest tank battle of the war. But, according to the official US Army history of the war, problems of communication between tanks and helicopters in an environment of swirling smoke and sand forced the helicopters to break off and seek deeper targets – which is an interesting (negative) rationale for launching deep strikes.

Apache units managed to work more smoothly with other combat elements during the 24th Mechanized Division's interdiction of fleeing elements of the Hammurabi division. In this case, artillery, armor, mechanized infantry, and Apache units worked together to halt and obliterate a long column of Iraqi vehicles. Here the coalition forces employed a spatial and temporal division of labor among their various combat arms; their cooperation was simplified by having them attack at different points or times. This worked fine against an exposed linear target. Helicopter units, for their part, helped block the Iraqi column to the north and also attacked it from the east. Attacking 18 abreast, the Apaches were able to destroy 102 Iraqi vehicles.

Thus, during Desert Storm the US Army used combat helicopters in various ways, in a variety of combinations with other units, and sometimes in fairly large formations (brigade-size or larger). The US GAO has cited Army Aviation data crediting Apache units with having destroyed more than 500 armored vehicles, 120 artillery pieces, 300 wheeled vehicles, and 240 other targets. For armored vehicles and artillery this amounts to about 7 percent of the total that the coalition claimed to have destroyed. Despite this significant score, the limitations of combat helicopters were also evident in the Second Gulf War – and what we did not see speaks as loudly as what we did see.

While the 101st Airborne Division did execute a deep assault into Iraq at the outset of the ground war, the first two moves of this assault did not occur over densely- or actively-held enemy territory. Operating from forward bases, the 101st Airborne remained dependent on land supply routes without which it could not have sustained high-paced attack operations for long. Keeping the Apaches supplied with ammunition and fuel – they consume 2.5 gallons per minute – was a concern throughout the land war. However, the units of the 101st Airborne enjoyed a fair amount of freedom in this war to set and modulate their own pace of operation (and consumption). They were not squeezed by enemy counter-attack. And the land lines on which they depended for adequate supply are points of vulnerability that a foe might easily exploit.

When operating over or close to large Iraqi formations, helicopter units in the Second Gulf War generally faced sporadic and light resistance from an already depleted, disorganized, and dispirited enemy. Combat helicopter attacks usually took the form of interdicting Iraqi units that were static or moving in convoys or in hasty retreat. In this context, the flat open terrain of the theater worked to the Apaches' advantage, facilitating reconnaissance, target acquisition, and standoff attack. The Apaches seldom 'mixed it up' with aggressive enemy units, nor did they often cooperate closely with friendly ground elements under conditions of intense combat.

This war did not test combat helicopter units in the way that a swirling battle of maneuver against a capable and determined foe might. Nor did it test them in the way that a war against a stealthy foe in enclosed terrain might. Operation Restore Hope in Somalia had tested helicopter units in this latter way, with unhappy results. The Kosovo war might also have imposed such a test on helicopter units – but US command authorities decided not to run the risk.

### 4 Official options

The current mainstream of doctrinal thinking about helicopter warfare in the West concentrates on the structuring and the tactical as well as operational employment of four basic types of formations. These formations can reach brigade or even division size:

# 4.1 Formations integrating heliborne infantry and powerful gunships

We have already introduced this type of formation and summarized the dilemmas associated with it. Transcending these dilemmas will be difficult, although there are a number of remedial proposals such as: (i) significantly improving reconnaissance by the addition of a strong element of scout helicopters to the formation or by better coordination with the Air Force (especially) as well as all friendly ground troops in the area of concern; (ii) enhancing the firepower of the airborne platforms; and (iii) improving armor protection and/or stealth characteristics throughout the fleet.

# 4.2 Attack helicopter formations linked with mechanized cavalry

Another operational concept involves the close organic cooperation of attack helicopter formations (including recce and utility machines for immediate support) with ground-mobile elements of mechanized cavalry. In this concept, heliborne infantry are left out. This kind of arrangement may be well suited for missions such as offensively probing a defensive array, spearheading or pursuit, mounting a cavalry screen for heavier forces, defensive area control, and the covering of retrograde (delaying) actions.

This type of employment is also very dependent on superior intelligence and a high level of co-ordination among all the relevant actors inside and outside the combined arms team. A key issue is the flexibility of the labor division between airborne and ground-mobile elements. If the helicopter forces are too tightly connected to their comrades on the ground, we would – once again – get a case of tactical rigidity. This is true even though the ground element – in this case, mechanized cavalry – has greater mobility than dismounted infantry lacking vehicles.

### 4.3 Bundeswehr air-mechanized concept

The third type of formation is represented by a brigade-size organization currently under development by the German Bundeswehr. It comprises a squadron of scout helicopters, two regiments of attack helicopters, and a regiment of utility helicopters. The Bundeswehr calls this structure air-mechanized. Originally the Bundeswehr had planned for each attack regiment to have 48 Tiger Eurocopters and the support regiment to possess an equal number of NH-90 medium transport helicopters. However, budget realities may have compelled a revision in these plans. (It now appears that the Bundeswehr is unlikely to procure more than 80 Tigers total.)<sup>8</sup>

Interestingly the brigade's transport regiment does not carry dismountable troops for ground combat. The whole formation is intended to stay up in the air. In order to be able to accomplish this, the assigned transport machines carry fuel for range extension. The other supporting functions of these machines include electronic monitoring and counter measures, NBC probing, command and control as well as evacuation of shot down or incapacitated crews. Similar ideas are being developed in some other western nations – France for instance.

Typically such rotocraft combat forces are to be employed at the operational level, at the disposal of a corps commander. The idea of creating air-mechanized combat elements dates back to the Cold War, to the early eighties: a time when there was much talk about Soviet Operational Maneuver Groups (OMGs) and the evolving Airland-Battle doctrine of the US Army. Military leaders and experts were preparing to dispense with the notion of linear battle. Imagining the future, they thought that freewheeling maneuver warfare – non-linear battles with open flanks and occasional insular constellations – was increasingly likely. In this context, advanced thinkers looked to employ air-mechanized formations to find open enemy flanks and to strike deep. They hoped to gain the initiative in battle by posing a threat to vital installations of the other side's command structure.

<sup>&</sup>lt;sup>8</sup> R. Kammerer: "Die Luftmechanisierte Brigade", *Europäische Sicherheit*, Vol 50, No 3, 2001, p 166.

Even more so than the other types of helicopter operations we have examined, the air-mechanized approach is heavily dependent for success on superior reconnaissance and the close co-ordination of all the friendly actors involved. The challenge grows geometrically with the depth of the contemplated penetration of enemy territory. And because things in war often go wrong, preferably all the machines in the formation should have substantial armor protection and/or stealth characteristics. But, back to reality: the German air-mechanized brigade currently under development would fail in this respect. Although the attack helicopter (the Franco-German Tiger) and the transport machine (NH-90) to be procured are among the most expensive assets of their kind, their armor protection is rather weak and their stealth features are not worth the name.

### 4.4 Heliborne light mechanized infantry

Our final case does not appear at first glance to be a combined arms approach, but instead simply an auxiliary use of heavy load helicopters to allocate very light armor to the vicinity of crisis points. The emphasis is on vicinity. In this concept light mechanized ground elements are to be flown to areas of relative safety, but in easy reach of the zone of military action with the aim of impeding an enemy breakthrough.

This approach, pioneered by the German Army, has the particular advantage of not attempting to land helicopters in the midst of dense hostile fire (typically found in the zone of direct confrontation). And since light mechanized forces are capable of quick cross-country marches, the concept also allows the commander considerable flexibility in choosing landing areas.

In the days of the Cold War the German Bundeswehr intended to send heavy lift helicopters (CH-53) each carrying two armored vehicles (the tracked Wiesel) of about 3 metric tons across friendly territory to block advancing Warsaw Pact spearheads somewhere near the FLOT.<sup>9</sup>

<sup>&</sup>lt;sup>9</sup> Wiesel midget tanks for heliborne employment were part of German Army planning since the early 1980s, but their actual production did not commence before the early 1990s.

The Wiesels would sport either 20 mm machine cannon or TOW missile launchers. Notably, there were no plans to use these assets in bold operational maneuver schemes – deeply penetrating an opponent's territory.

Since the end of the East-West confrontation, new scenarios have emerged in which heliborne light armor might play a part – such as efforts to relieve and defend humanitarian sanctuaries. These might require heliborne light armor to cross hostile areas. This leads to the idea of attaching scout and heavily armed escort helicopters to the transport formation. The importance of such missions may make this attachment necessary on a permanent footing and require an organic form of combined-arms integration. This is why this concept has been discussed in the combined-arms section.

#### 5 Future foes

As mainstream military thinking imagines the employment of masses of rotocraft, combined-arms fashion, for quite demanding purposes at the operational level, we might stop a moment and ask a simple question: Are we likely to face opponents warranting such an endeavor? More specifically: can we plausibly assume that Western forces will clash in the foreseeable future with relatively strong mechanized foes and fight maneuver-style non-linear battles in which large helicopter formations might play a critical role?

Today's rogue states are not what they used to be: North Korea may expire in a couple of years, Iraq remains under tight international control, Iran is in a process of democratization, Libya seeks friendly relations with the West, and Serbia is no longer under the rule of the Milošević family. Other rogue candidate countries simply lack the resources to challenge the West on the scale or in the way suggested above.

India and Pakistan are in a constellation of mutual neutralization. Finally, there is the prospect of old foes – Russia and China – becoming new ones. Could the former once again generate a conventional military threat of some credibility, and would the latter be able to stabilize its force modernization program long enough to produce a high-caliber military capable of very large-scale combined arms maneuver? Should we even assume that we are on a collision course with these nations? Of course, given enough time – twenty or more years – anything is possible, but this is hardly a good basis for wagering large amounts of scarce resources to build one particular type of narrowly-specialized combat force today.

If instead we ask what are the actual operational requirements that press on us today and that we can see rising, our attention is drawn to what the US military calls complex contingencies and combat operations other than war. The most likely crisis scenarios of the foreseeable future may have to do with civil wars that must be stopped or contained by the international community in order to avoid (further) bloodshed and prevent regional destabilization. Likely missions might be the creation and active defense of humanitarian sanctuaries, preventive deployments to protect a country under imminent threat, or the escort of humanitarian convoys.<sup>10</sup> (The escort function should be approached with caution, however; although the point would be to detect and perhaps interdict threats to a convoy, helicopter escorts might themselves become easy targets.)

If in such missions – especially the creation and defense of sanctuaries – helicopters are used for operations over hostile territory, their commanders are well advised to be cautious. In a civil war the exact positions of the contending parties are often hard to determine. Even more than in conventional maneuver warfare there is constant change involving a multitude of actors – and often at a finer level of resolution. That is, dispersed small unit operations usually predominate.

This implies that even the highest-performance reconnaissance may not be sufficient to reliably find and map those open flanks necessary for conducting deep helicopter operations with acceptable risk. Indeed, there may not be any open flanks at all. Members of armies, militia, or armed gangs may be effectively everywhere. Even if thinly spread, they may pose a considerable threat to passing helicopters. This is due to the recent proliferation of heavy machine guns, light machine cannon (with

<sup>&</sup>lt;sup>10</sup> Consider, for instance, the case of a country that has – democratically correct – seceded from an authoritarian union whose forces are then trying to bring it back home.

high velocity arrow-shaped projectiles), and highly accurate shoulderfired guided missiles. In zones characterized by instability, such weapons are becoming ubiquitous among both regular and irregular troops.

#### 6 Lessons learned

Helicopters are expensive and vulnerable. By increasing their agility, armor protection, and stealth characteristics we can to a limited extent enhance the survivability of these machines – but such improvements add substantially to their cost, which is already quite high. Nonetheless, the use of helicopters in auxiliary roles or in a tactical single-arm approach (such as flying high-precision "artillery") has been quite satisfactory so far.

With regard to the operational use of massive (combined-arms) heli-formations, however, there are good reasons for skepticism. First, there are few real and present scenarios in which such employment schemes seem truly necessary. Second, even in situations where such schemes might play a critical part, they entail considerable risk. And this pertains to their likelihood of success. Routine operations over contested territory are – from a standpoint of risk minimization – only acceptable if the equipment is distinctly first rate and everything (especially recce and co-ordination) goes right. In war the latter is a dubious assumption.

Generally, helicopters should fly over hostile ground only in exceptional cases. This limits their use in certain civil-war scenarios – where potently-armed militia and gangs could be almost everywhere.

Helicopters, like air power generally, have inspired hopes (and fears) of rapid offensive action in war. However, while demonstrating great value in some roles, this instrument has not yet proven itself to be a decisive arm. Because of its inherent limitations, there is good reason to doubt that it can – except perhaps in limited circumstances. In Vietnam and Afghanistan, where helicopters played a leading role fighting up-front in large combined arms formations, the costs were high and the results uneven (Vietnam) or poor (Afghanistan).

Combat helicopters performed more successfully in the Second Gulf War, but their limits were also evident: deep operations posed a severe logistical challenge and their cooperation with other elements was fraught with risk. The largest deep operations skirted areas of enemy concentration; in this case, the avenues open for safe passage were vast. Perhaps most important, they operated against an enemy who had been prepared by five weeks of devastating aerial bombardment. Such preparation cannot be assumed, nor can any nation but one mount it.

These conclusions call into question the fascination with the combat use of rotocraft shared by the US Army and some of its major European allies. But the United States takes the lead; Europeans want to measure up to the Americans in order to be considered serious partners. The hitch is this: not even the United States seems able to afford the type of helicopter fleet that the army's current doctrine prescribes (although at least its investment effort is credible). As for the rest of the world: no one can come even remotely close to fielding and properly maintaining this type of force – a fact confirmed by the downward revision in Germany's plans for air-mechanized forces. Actually, their prohibitive cost gives attack helicopter forces an attraction quite apart from their track record or proven usefulness; possessing this putative capability or even appearing to posses it has political and strategic cachet.

In the US Army, helicopters came into their own during the 1960s, the Vietnam War decade, when their numbers rose from 2,500 to 9,500. Today, the hope that helicopters can play a leading maneuver role on a large scale is solidly institutionalized in the US Army's aviation branch. And that hope is sustained indirectly by the many vital and undisputed services that helicopters can and do provide. In public perceptions the combat helicopter already is at least the equal of the Abrams tank as a symbol of the Army's technological sophistication – and the tank is losing ground. This matter of symbolism is no small thing. It figures in public support, recruitment, and the inter-service competition for dollars.

And so, in trying to understand the continuing fascination with the combat role of helicopters we end where we began: with an appreciation of the power of this machine as a political and military symbol.

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#### Addendum

In the wake of cuts in the procurement of Tiger helicopters the German Army has revised its plans for a brigade-sized rotocraft formation. As we have learned (section 4.3), there will be no more than 80 Tigers. This number is insufficient to equip two regiments of combat helicopters. The new concept suggests to organically couple one regiment of Tigers with one regiment of NH-90s and a regiment of light infantry ("Jäger"), possibly flying on CH-53 Gs. This indicates a step back to a previous pattern of organizing helicopters for battle. We have already dealt with it in sections 3.3 and 4.1.

## Bibliography

Csoboth, I.: "Wird der Landkrieg luftbeweglich?", Europäische Wehrkunde, Vol 33, No 5, 1984, pp 297-299.

Ertl, M.: "Ein neues Element auf dem Gefechtsfeld. Die luftmechanisierte Brigade 1", *Soldat und Technik*, June 1997, pp 370-374.

Köhler, H.: "Schnelle luftbewegliche Eingreifverbände", Soldat und Technik, June 1991, pp 396-405.

MBB, ed.: Verwundbarkeit der Hubschrauber, MBB-DS-Informationen 7/70, Blatt 244-250, Munich 1970.

US Army Field Manual 17 - 47, Air Cavalry Combat Brigade (Washington DC: Department of the Army, April 1977).

US Army Field Manual 7 - 30, Infantry, Airborne, and Air Assault Brigade Operations (Washington DC: Department of the Army, April 1981). US Army Aviation Center, *Field Manual (Co-ordinating Draft), Combat Aviation Operations* (Fort Rucker, Alabama: US Army Aviation Center, September 1983).

US General Accounting Office, *Operation Desert Storm: Apache Helicopter Was Considered Effective in Combat, but Reliability Problems Persist* (Washington DC: GAO, April 1992).

US Department of Defense, *Conduct of the Persian Gulf War: Final Report to Congress* (Washington DC: DOD, 1992).

# ROTOCRAFT FOR WAR, PART 2 HELICOPTERS IN THE U.S. WARS SINCE 9/11 Carl Conetta

#### 1 New missions, old dilemma

Recent military experience in Afghanistan and Iraq has prompted a significant change in American ideas about the combat use of helicopters, implying a greater emphasis in the future on small-unit combat support roles. These have significantly supplanted ideas of deep attack and large-scale helicopter assaults. These changes have not really surmounted the dilemmas associated with rotary-wing aircraft, however. Indeed, recent experience starkly illustrates these dilemmas. And nothing is more telling than the high attrition rate for helicopters in operations *Enduring Freedom* and *Iraqi Freedom*.

Since 2001, the US military has kept an average of approximately 550 helicopters of all types in the Central Command area, which encompasses both the Afghanistan and Iraq wars. (As of August 2008, there are more than 600 involved in these conflicts.) All told, in seven years, the United States has lost about 25 percent of the average number of deployed helicopters, that is: 136 helicopters lost – at least one-third of these to enemy action.<sup>1</sup> Moreover, the Army estimates that 3 percent of its entire fleet of 3,150 helicopters will be 'washed out' due to recent military operations and will require replacement. This, despite spending an average of \$500 million per year to 'reset' those craft returning from service in Afghanistan and Iraq.

<sup>&</sup>lt;sup>1</sup> "General says US Army has lost 130 helicopters in Iraq and Afghanistan", *International Herald Tribune*, Associated Press, 23 March 2007.

To restate the dilemma that frames our analysis:

- ~ Helicopters are prized for their unique combination of mobility, flexibility, and agility as well as their putative capacity to work closely with ground forces and provide them with persisting support. But these promises and capabilities are offset by issues of cost and vulnerability.
- Once deployed, helicopters prove acutely sensitive to environmental conditions, are relatively fragile, and can be engaged throughout their performance envelope by multiple, relatively-inexpensive weapon systems. These vulnerabilities can be mitigated, partially – but only in ways that substantially increase costs while narrowing the scope of the crafts' usability.

More than ever before, fielding military helicopters is a high-cost proposition. In 2008, the value of an Apache AH-64D ranged between \$34 million and \$48 million, depending on the level of upgrades. To keep them flying requires a complement of 30 support personnel each. And, due to maintenance scheduling, it takes a fleet of 30 Apaches to keep eight available in the field.

Any nation hoping to frequently deploy and use combat helicopters in operationally significant numbers must have very deep pockets and a certain insensitivity to cost and cost-effectiveness – as though it has money to burn. Even then, higher command and political authorities may, at the last moment, prove unwilling to risk these costly assets in the types of missions for which they were supposedly procured. Thus, the crash of two US Army helicopters at the outset of the 1999 Kosovo war contributed to keeping Apaches out of that conflict entirely (although 24 had deployed to fight).

Nations with fewer helicopters to spare than does the United States will be even more cautious about putting them in harm's way. Thus, peace operations in Chad and Darfur have had a difficult time attracting sufficient numbers of even transport types. The problem is not that the world has too few military helicopters on hand, however. All told, UN operations employ about 150 helicopters worldwide – out of total member military holdings that exceed 12,000.

# 2 Pivotal experiences in the Afghanistan and Iraq wars

The most important factor influencing post-9/11 US helicopter operations was the general shift in US security concerns from conventional warfare to counter-insurgency efforts. Counter-insurgency scenarios typically involve too few forces attempting to secure too much space. In this context, helicopters promise a capacity to rapidly concentrate troops and firepower across large expanses of territory despite poor ground transportation nets. This is something of a return to origins for military helicopters, calling to mind their early use in the Vietnam and Algerian conflicts.

Also important in shaping recent US practice were a host of negative experiences in Somalia, Afghanistan, and Iraq. The net result of these has been to undermine command enthusiasm for large-scale deep operations by armed helicopters and to raise a caution flag on air assault operations as well. (The latter involve using helicopters to insert infantry units deep in enemy territory with attack helicopters providing support).

# 2.1 Operation Anaconda and the challenge of air assault

Depositing lightly armed troops deep in enemy territory is a high risk gambit. Success depends on luck, good intelligence, and close coordination among different arms. The vulnerability of the troops leaves little room for mishaps, while the vulnerability of the helicopters and their sensitivity to environmental conditions raises the likelihood that mishaps will occur. Operating in mountains or other challenging environments adds to the risks and uncertainties. Operation Anaconda illustrates how easily things can come undone.

In March 2002, three months after the fall of the Taliban regime, US forces led an effort to kill or capture Taliban and Al Qaeda fighters still holed up in the Shahi-Kot Valley. The plan was to have pro-government militia (stiffened by US air power and special operations units) engage the anti-government forces, while other US forces stemmed their retreat

– a hammer and anvil operation. Helicopters were to deliver US troops – the 'anvil' – into blocking or observation positions and provide them with fire support. However, upon being inserted, the first wave of about 200 US personnel unexpectedly found their landing areas to be swarming with Taliban fighters. Due to environmental conditions, difficult terrain, and the density of enemy fire, Apache gunships were unable to provide sufficient fire support.

All of the seven Apaches involved sustained significant damage – and five were compelled to return to base (although three of these returned to the fight within 24 hours). Deployment of a second wave of US 'anvil' troops was postponed and half of the first wave was evacuated that night. Given heavy support by fixed-wing aircraft, deployment re-commenced the next day. Under a revised plan, fixed-wing bombardment continued for nearly a week before US and pro-government forces secured the valley. Central Command claimed that between 500 and 770 anti-government forces had been killed, although only dozens of bodies were found.

In a related incident, an attempt to land a US SEAL reconnaissance team near a peak (Takur Ghar) overlooking the Shahi-Kot valley also ran into unexpected heavy fire. One of the two Chinook transport helicopters carrying the team was hit by an RPG and both were forced to fly off – but not before a team member fell out and into the hands of the Taliban. The damaged Chinook made a controlled crash-landing seven kilometers away and its crew was rescued. A subsequent attempt to land a rescue team for the SEAL who had fallen from the chopper near Takur Ghar also came under heavy fire, but successfully inserted the team before flying off, damaged. Finally, an effort to reinforce this team similarly met heavy fire. Another Chinook was hit by an RPG and crashed, killing four on board.

The challenge of helicopter operations under fire in difficult mountain terrain was illustrated again more than three years later (28 June 2005) when a MH-47 Chinook sent to rescue another trapped SEAL team was hit by an RPG. Badly damaged, it was nonetheless able to land on a high ledge. Unfortunately, the ledge gave way and the helicopter toppled down the mountainside. All 16 service people on board were killed. Due to high altitudes, the Apaches that had been escorting the Chinook could not keep pace, so it had to fly into the hot zone without fire support. (Russian heliborne troops faced a similar tragedy in Chechnya on 27 April 2007 when the rotor of their Mi-8 helicopter struck a mountain side while trying to land special operations troops. It tilted over, slid down the mountain side, and burst into flames, killing all 20 on board.)

The troubles encountered in Operation Anaconda also call to mind the October 1993 "Black Hawk Down" incident in Mogadishu, Somalia. There, an air assault raid into a militia-controlled area of the city was stalled when RPGs brought down two MH-60 Black Hawk helicopters. A blizzard of small-arms fire and RPGs held support helicopters and relief convoys at bay for 14 hours. Nineteen Americans were killed and 73 wounded.

## 2.2 Karbala, Iraq – deep attack undone

On 23 March 2003, three days after the onset of the Iraq war, 31 Apache helicopters of the 11th Attack Helicopter Regiment (some organic, some attached) set out to deplete the armor and air defenses of the Iraqi Medina Division near Karbala. As was doctrine, they flew low in packs toward their objective. However, en route they became ensnared in 'flak traps' – storms of small arms fire, rocket-propelled grenades, and man-portable missiles, originating from roof tops. This *ad hoc* air defense effort, which was reminiscent of Somali tactics ten years earlier, had probably been triggered by Iraqi pickets equipped with either cell phones or low-power radios. The fire brought down one of the Apaches and damaged all the others sufficiently to compel their return to base. The experience dampened command interest in attempting helicopter deep attack thereafter.

Following the Karbala incident, attack aviation focused mostly on reconnaissance efforts, flank security operations, and the provision of fire support (Close Combat Attacks or CCAs) for advancing ground units – especially in built-up areas. According to one observer, this "signaled the rebirth of aviation in a close fires role and represented a paradigm shift from a decade-long infatuation with deep attacks".<sup>2</sup>

One partial exception – a denouement, actually – was a 28 March helicopter attack on the 14th Mechanized Brigade of the Medina Division conducted by the aviation units of the 101st Airborne. This was a more deliberate effort than the 23 March attack by the 11th AHR, with the units carefully reconnoitering and clearing zones as they proceeded, and pulling back when they faced heavy ground fire (so that artillery and fixed-wing aircraft might suppress it). As a result, no helicopters were lost to enemy action (although two succumbed to accidents). On the downside, the attack claimed only a handful of Iraqi armored vehicles, artillery, and air defense systems. Caution has its price as well as its benefit.

# 3 Recent counter-insurgency operations – a helicopter renaissance?

Despite the experience of Operation Anaconda and the failed Karbala mission, helicopters have come to play a central role in recent counter-insurgency efforts. Today, they are key providers of transport, with armed types acting as escorts. Gunships also serve to provide security to ground convoys. And they serve in reconnaissance, surveillance, and 'close combat attack' roles, providing ground units with 'over the shoulder' firepower. Sometimes they act independently in smaller-scale counter-insurgent strike efforts. In urban cordon and search operations, they have acted to block and interdict insurgents attempting escape. During the 2008 operations in Sadr City, at least a half-dozen Apaches were kept in the air at all times, employing hundreds of Hellfire missiles over a few weeks.

The fact that helicopters are serving broadly does not mean they are the optimal choice for all the tasks they have been assigned, however. They are an asset that America held in abundance before the onset of the current wars. Despite America's unique investment in them, they have not escaped the dilemma associated with their vulnerability. This

<sup>&</sup>lt;sup>2</sup> R. M. Cassidy: "Renaissance of the attack helicopter in the close fight", *Military Review* (July-August 2003), pp 38-45.

can be appreciated by analyzing the types of threats they have faced in recent wars and the ways these threats have been managed.

# 3.1 Environmental challenges and maintenance overload

As noted earlier, helicopters seem to offer a ready-made solution to the force-to-space problems that often plague counter-insurgency efforts. It is just as important to note, however, that insurgencies are most likely to flourish in physical environments that helicopters will find challenging.

As we have seen above, jagged terrain and cityscapes make landings difficult and they offer insurgents occluded firing positions. Telephone and electrical wires in and around cities have claimed at least four helicopters. Thin mountain air saps lift and power, degrading performance and shortening helicopter 'on station' time. High ambient temperatures also stresses engines and limits lift. Snow storms in Afghanistan, sandstorms in Iraq, and wind and rain storms in both limit visibility and make controlled maneuver difficult.

Environmental conditions too frequently require that helicopter use be curtailed, which can disrupt joint operations. Such problems effected the conduct of *Operation Anaconda*, delayed planned helicopter attacks at the start of *Iraqi Freedom*, and limited helicopter use to daylight hours for 10 crucial days during the first phase of the war.

Sand and dust pose persistent problems. Most of the helicopter accidents in Iraq and Afghanistan are due to 'brownout conditions' in which the downwash of rotors kicks up an envelope of blinding dust. To compensate, pilots execute 'no hover' landings, touching down while their aircraft are still moving forward – a practice that stresses the rotor gears and airframe. Sand and dust continuously coat, clog, and erode mechanical and electronic gear (notably including infrared missile warning systems). Despite regular maintenance in the field, one helicopter was found to harbor 230 pounds of sand when it rotated home, according to the commander of the Army Aviation Center.<sup>3</sup>

Helicopters fly between 30 and 50 hours per month, on average, in Afghanistan and Iraq, which is considered a high operational tempo. The Army has been able to sustain a 77 percent readiness rate for its deployed helicopters by substantially boosting its field maintenance efforts, routinely rotating helicopters into and out of the theater – only 17 percent of the total inventory is deployed at any one time – and mounting an ambitious \$4 billion helicopter 'reset' program at home. Today, maintenance crews make up 85 percent of the Army aviation force. By contrast, British forces, unable to match American resources, have seen their helicopter readiness levels in theater drop to 50 percent.

#### 3.2 The insurgent threat

Modern attack helicopters and the doctrine for their use developed with reference to Soviet armored forces in Europe. There, the expected main threat to helicopters were radar guided (and infrared homing) missiles and anti-aircraft cannon (notably the ZSU-23-4, an armored self-propelled system with four 23-mm guns). Helicopter attack scenarios envisaged fixed-wing aircraft neutralizing most of these weapons. Helicopters were supposed to approach their objective flying nap-ofthe-earth (to lessen their exposure) and then pop-up on arrival to deliver anti-tank missiles at standoff ranges. Presumably, most of their flying would occur over threatened, but not enemy-controlled territory. Clearly, such scenarios have little relevance to America's post-9/11 wars.

The insurgent threat to helicopters in Iraq and Afghanistan includes small arms fire, anti-aircraft machine guns (notably the 12.7 mm DshK), rocket-propelled grenades (notably the RPG-7), and portable surface-to-air missiles (principally the SA-7, but also the SA-14 and SA-16). While small-arms fire is often spontaneous, the use of RPGs, portable missiles, and heavy machine guns is not. Insurgents often fight in air defense teams that combine weapons, spotters, and communications

<sup>&</sup>lt;sup>3</sup> P. Hess: "Army Needs \$1.2b for Chopper Replacement", *United Press International*, 2 January 2006.
personnel.

Favored sites in Iraq are roof tops, court-yards, alleys, and groves. Small open-bed trucks carrying weapons covered with a tarp offer a means to rapidly concentrate weapons – especially heavy machine guns – and then disperse. Favored targets include helicopters flying predictable transit routes or conducting routine reconnaissance. Any coalition effort that concentrates helicopters over a period of days, or any area that regularly attracts helicopter surveillance, also offer insurgents an opportunity to concentrate their air defense efforts.

The contest between insurgent tactics and helicopter countermoves is evident in the 20 January 2007 downing of a UH-60 Black Hawk helicopter in which 12 died. In this case, the second helicopter in a team of two took fire, tried to land, and was hit again by an RPG round. The lead aircraft immediately returned fire and then landed in an effort to assist the downed crew.

Soon, another set of Black Hawks joined the fray as did two attack helicopters. These destroyed a truck mounting a heavy machine gun as well as three houses near some trees where a second anti-aircraft gun was hidden. Shortly afterward, a rapid reaction team of seven armored jeeps (HMMWVs or "Humvees") arrived. One was hit by an improvised explosive device, however, which killed another soldier. After securing the area, they additionally found missile launchers and a mortar tube.

There are technological counter-measures available that are usually effective for dealing with those anti-aircraft missiles currently in insurgent hands – as long as helicopters fly high enough to allow for reaction time (minimally, above 2,000 meters). However, as noted below, the best counter-measure systems have not always been installed – nor will be. And there are no counter-measures yet available for the small arms, machine gun, and RPG threats.

RPGs are very effective up to 200 meters, but also have scored hits as far out as 700. Small arms are out-ranged beginning at 1,000 meters. Heavy machine guns in skilled hands can be quite effective up to 1,500 meters. So, taken together, these weapons can make flying below 2,000 meters quite perilous. Unfortunately, given the nature of these conflicts, there are no or few truly secure zones.

In providing fire support or striking insurgent targets, pilots would

prefer to engage from standoff ranges – at least three kilometers, using missiles. Cannons require closer shots, however: 1,500 meters or less. Indeed, in order to distinguish individual combatants, helicopters often must fly closer. And, of course, insurgents will choose to engage at close ranges. Thus, most engagements occur at distances of less than 1,000 meters, which puts helicopters within range of an array of weapons.

# 3.3 Technological countermeasures

Ideally, helicopters in harms way – which includes all types in Iraq and Afghanistan – would have infrared heat suppressors as well as rugged, advanced missile warning systems, flare dispensers, and active jammers. At the start of the Iraq war, however, only special operations types met this standard. Most conventional scout and attack helicopters had older warning and jamming systems and no flare dispensers. Some lacked infrared suppressors. Transport types were worse off. As the war progressed (and helicopters fell from the sky), warning and jamming systems received upgrades, and these began to spread from attack models to transport types. Yet, as of August 2008, coverage was still not complete. And existing upgrade programs have not kept pace with the threat. Losses to enemy fire in Iraq during 2006 and 2007 – before many Sunni and Shia militia stood down – were greater than those during the preceding two-year period.

Losses not withstanding, there is no likelihood that even the attack helicopter fleet will be upgraded to the standard of special operations craft. Upgrades to the latter cost about \$19 million per airframe in 2004, while upgrades to conventional helicopters were in the range of \$3 million each. Cancellation of the Comanche program has made possible a more thorough upgrade program for the conventional fleet. But the savings cannot close the gap because they are also supposed to help the Army generally modernize its helicopter fleet.

Equipping the Apache AH-64D with best protection would probably drive the per unit cost into the \$45 million to \$55 million range. The RAH-66 Comanche faced cancellation in 2004 when its unit cost rose to nearly \$59 million. Helping to motivate that decision was the realization that, despite the Comanche's many advanced features and high cost, it was not well protected against the insurgent threat. Additional upgrades would have had to be made.

# 3.4 Tactical countermeasures

No foreseeable technology will cure the vulnerability of these fragile machines as they operate over and within complex terrain, ridden with adversaries. Indeed, the principal means of alleviating helicopter attrition in Iraq and Afghanistan have been tactical and operational, not technological. But these have imposed their own limits and costs.

Helicopters have taken to flying in small teams – usually two – rather then alone or in large groups. Team members keep 500 meters between them, so that one might cover the other and both might divide the labor of identifying and engaging targets. More generally, the importance of working together with other arms has been emphasized. Thus, for instance, fixed-wing aircraft might escort helicopters in especially dangerous areas.

Crashes are most common at night, but day time is when insurgents have their greatest success in downing helicopters. Night-time dangers can be mitigated by flying above terrain obstacles and landing only on landing strips in secure bases, however. Unlike early in the war, by 2007 plenty of these bases existed. So night flying increased. Still, most close combat support operations require daytime flight. And reconnaissance and transport tasks cannot be restricted to night.

When conducting operations, nap-of-the-earth flying is no longer attempted. Shooting on the run or while diving has largely replaced stationary fire techniques or 'hovering fires' (except sometimes at night). This, of course, complicates the task of acquiring and accurately engaging targets.

Helicopters have also taken to flying faster and higher when transiting 'hot spots'. Predictable transit corridors – such as those that might follow surface lines of communication – are avoided. And numerous no fly zones have been designated. Complementing these are shifting danger zones over which pilots must exercise greater caution.

## 4 Seeking alternatives

The measures outlined above probably have helped prevent a debilitating rise in the numbers of helicopters claimed by insurgent action. But they succeed by narrowing the utility of helicopters – that is, by revoking the promise of a 'go anywhere, do anything' flying machine. (Similarly, the wider adoption of advanced countermeasures systems help drive the cost of helicopters toward prohibitive heights).

These factors, and the inherent vulnerability of helicopters, make a search for alternatives worthwhile. One approach is to avoid using helicopters for tasks that other arms – artillery or fixed-wing aircraft, for instance – might accomplish just as well and more safely (as the US Marine Corps' Cobra Survivability Plan concluded early in the war).<sup>4</sup> In many situations, the armed reconnaissance role is better fulfilled by more heavily armored *ground forces*, with helicopters relegated to standoff surveillance and fire support. Unmanned Aerial Vehicles (UAVs) might substitute for helicopters in performing many surveillance and reconnaissance tasks – and they increasing are. Especially in cities and other complex environments, UAVs are substituting for scout helicopters (such as the OH-58 Kiowa Warrior).

# 5 A tilt-rotor alternative to helicopters?

One alternative not worthy of consideration is increased reliance on tilt-rotor aircraft, such as the US Marine Corps MV-22 Osprey. The Osprey's one sure advantage is its capacity to fly 40 to 60 percent faster than helicopters when it operates in airplane mode. Thus, it is presumed less vulnerable when in flight. But its cost – \$75 million per unit (2009) – is much higher and its transport efficiency is much less than that of comparable helicopters. Helicopters equal in power and empty weight to the MV-22 can carry much more payload to any distance. The CH-53E Super Stallion, for instance, costs approximately \$40 million, but it can carry twice as much payload to 400 nautical miles. And the

<sup>&</sup>lt;sup>4</sup> R. Wall and D. A. Fulghum: "Coming Under Fire", *Aviation Week & Space Technology*, 12 May 2003.

difference between helicopters and tilt rotors in terms of transport efficiency increases with altitude, which is relevant to operations in mountainous terrain.

The MV-22 figures centrally in the Marine Corps' plans for "rapid maneuver from the sea", thus they are loath to surrender it. Actually, comparable helicopters could do the job faster whenever several round trips are required. This, due to their transport efficiency advantage. But the MV-22 speed advantage holds true if only one or two waves are planned. What happens on arrival is another matter, however.

In hover mode, the MV-22 is considerably less stable than helicopters and must descend slowly and carefully, which increases its exposure precisely when insurgents might be closest. Maneuverability in hover mode also is compromised. These limits reflect efforts to address persistent aerodynamic problems ("vortex ring state"), which also make the craft likely to kick-up especially disruptive dust clouds when landing.

In 2007-2008, 12 MV-22s deployed to Iraq, but these were not used in high-threat missions or areas. During 2,500 sorties, pilots reported being fired on twice. Given substantial manufacturer support, the Osprey's in Iraq where able to achieve a 68 percent average readiness rating – which is still below that achieved by older helicopters in theater. The aircraft also has faced persistent engine problems. These compelled at least one emergency landing in Iraq, while a series of engine fires have plagued the craft back home. (All told, 30 personnel have been killed in crashes during Osprey test flights between 1991 and 2000.)

Despite its troubles, the Osprey has gained popularity as a VIP taxi in Iraq – a favorite of top brass and visiting dignitaries and celebrities. Notably, on 22 July 2008, a flight of four transported Senator Barack Obama from Al-Anbar province to an airport in Amman, Jordan. Without question, images of the four odd-looking craft landing together were impressive. But even as showman, the Osprey is unlikely to supplant the helicopter – at least, not until some footage of it deftly maneuvering in battle supplants the ubiquitous videos of its spectacular test crashes.

Washington, DC, September 2008.

# Bibliography

Blandy, C.W.: North Caucasus: Problems of Helicopter Support in Mountains (Defence Academy of the United Kingdom, August 2007).

Chandler, J.G.: "Reset: Army Aviation's Change of Mindset", Overhaul & Maintenance, Vol 13, No 7, July 2007, pp 42-43.

Chavanne, B.: Marines May Seek New V-22 Engines. *Aviation Week*, 18 March 2008

Colucci, F.: "Army's War-Weary Choppers Get Repairs", *National Defense*, February 2005, pp 48-49.

Colucci, F.: "Finding Ways To Stay In The Fight", *Rotor & Wing Magazine*, 1 May 2005; Journal online, available at: http://www.aviationtoday.com/rw/military/attack/1534.html.

Coniglio, S.: "Combat Helicopter Survivability", *Military Technology*, March 2005, pp 70-73.

Cordesman, A.H.: *The Air War Lessons of Afghanistan: Change and Continuity* (Washington D.C.: Center for Science and International Security, December 2002.)

Erwin, S. I.: "Army Aviation Must Change To Stay Relevant, Says Panel", *National Defense*, March 2004, pp 26-27.

Eshel, D.: "The Insurgency Anti-Helicopter Threat", *Military Technology*, March 2005, pp 67-70.

Gaillard, L.: V-22 Osprey – Wonder Weapon or Widow Maker? (Washington DC: Center for Defense Information, 2006).

Johnson, D. E.: *Learning large lessons: the evolving roles of ground power and air power in the post-Cold War era* (Santa Monica: Rand Corporation, 2006.)

Lambeth, B. S.: Air Power Against Terror: America's Conduct of Operation Enduring Freedom (Santa Monica, Rand Corporation, 2005).

Magnuson, S.: "Army helos can thwart missiles, but remain vulnerable", *National Defense*, August 2007, pp 58-59.

McLaughlin, G. A.: "Army Aviation's Evolution To Sustained Operations", *Army Magazine*, June 2004, pp 59-64.

Puttre, M.: "Rethinking Combat Helicopter Doctrine", Journal of Electronic Defense, Dec. 2003, pp 28-29.

Slife, Col. J.: "Shootdown solution", Armed Forces Journal International, June 2007, pp 16-20.

Taylor, D.: "V-22 Ospreys Saw Little Enemy Fire During First Deployment", *Inside the Navy*, Vol 21, No 18, 5 May 2008.

Thompson, M.: "V-22 Osprey: A Flying Shame", *Time Magazine*, 26 September 2007.

US Air Force: *Operation Anaconda: An Air Power Perspective* (Washington D.C.: February 2005)

US Congressional Budget Office: *Modernizing the Army's Rotary-Wing Aviation Fleet* (Washington DC: November 2007).

US Congressional Budget Office: *Replacing and Repairing Equipment Used in Iraq and Afghanistan: The Army's Reset Program.* (Washington DC: September 2007).

Wall, R.: "Cobras in Urban Combat", *Aviation Week*, Vol 158, Issue 15, 14 April 2003.

Withington, T.: "Helicopters: Operational Mobility", *ISN Security Watch*, 5 May 2008; Journal on-line: http://www.isn.ethz.ch/ isn/Current-Affairs/Security-Watch/Detail/?id=88742&lng=en

# IN A GLOBAL PERSPECTIVE: DOMESTICATING MILITARY INTERVENTIONS

### 1 Defining the topic

Armed interventions on behalf of the international community differ from traditional peacekeeping missions (using blue-beret contingents) in at least one vital aspect: the role of lethal force. Whereas in blue-beret missions weapons have been normally (and ought to be) confined to personal self-protection, the kind of military expeditions discussed here cannot, as a matter of principle, rule out the use of force above the individual level. Indeed, they imply the systematic application of combat power, if necessary.

This is not to suggest that traditional peacekeeping operations are going out of fashion. On the contrary, there likely will be a steady demand for neutral agents, symbolically representing the world community, to supervise armistice, demilitarization, and similar agreements after combatants have laid down their arms. In this role of quiet undramatic stabilization, blue berets have usually performed well – and it is deplorable that their contribution has not been sufficiently appreciated in the international arena.

Problems can arise, however, when troops trained, structured, and equipped for traditional peacekeeping (with its restrictive rules of engagement) are employed in missions such as the protection of humanitarian sanctuaries and convoys *under acute threat*. As shown by the events in Bosnia-Herzegovina from 1992-95, placing excessive military demands on blue-beret soldiers means abusing them. Predictably, the result is poor performance and, rightly or wrongly, a loss of respect for the ultimate authorizing agency, the United Nations. This state of affairs has encouraged those who favor lowering the threshold for employing maximum force in peace operations. This position has also called forth its opposite: critics who maintain that overkill approaches, while possibly suppressing conflict in the short term, will only stimulate long-term revanchist sentiments and undermine the prospects for a stable peace.

Lost in this polarized debate is another possibility: the use of armed intervention above the level of traditional peacekeeping, but substantially below that of intensive war-fighting. Associated with this is a unique principle of "adequacy": an employment of armed forces and (possibly) forceful measures that is sufficient to deal with and discourage military challenges, while not being of a character or magnitude that compromises the primacy of political conflict resolution.

Theory and profile of such adequate forces, that would neatly fit in with a holistic concept of political stabilization, have so far not been properly understood by the wider expert community. Yet in practice there were improvisations leading in the right direction.

In the context of several recent missions authorized by the international community it has been at least tried to tailor military contingents to the needs of "robust peacekeeping": to be able to fight, if necessary, but not in an escalatory manner. Examples are the UN and EU/ NATO peace-support regimes in Bosnia-Herzegovina (years after the Dayton agreement), post-war Kosovo (albeit with serious shortcomings), Macedonia, post-war Afghanistan and in Central Africa.

Apparently, the official understanding of military intervention lags behind established practice. Concepts that guide long-term military planning are, as we shall see, still very much influenced by quasiimperialist thinking and dreams of power projection with massive force. This is why soldiers out in the field, on peace support duty, are only rarely provided with an adequate equipment mix and often lack up-to-the-task leadership. Tailoring forces for such missions has all too often been characterized by makeshift approaches.

# 2 Pacifist fallacies

Pacifists in Central Europe and elsewhere often argue that armed intervention of any kind, regardless of authorizing agency, cannot lead to a resilient peaceful transformation of a crisis. Any armed intervention, they contend, has incalculable effects, too often leading to the destruction of those values, assets, or people that the intervention was supposed to protect.

They make a strong case for conflict prevention and resolution by peaceful means and for the strengthening of supranational institutions, representative of international law. These, they say, should be given the support and resources they need to develop effective capabilities for monitoring and mediating crises. These prescriptions are laudable, important, and entirely reasonable. Unfortunately, they are not enough.

What should the world community do when international efforts to stabilize a crisis situation or prevent a humanitarian disaster by peaceful means fail? What should we do when such efforts come too late or are not accepted by the parties directly involved? Are we to be left then with only two options: do nothing or yield to military doctrines of "decisive" force? This dilemma is especially acute because the competency of international agencies is presently so underdeveloped.

When the pacifists – especially the Greens of Austria and Germany – were confronted with media reports of mass rape, torture and murder during the "ethnic cleansing" of Bosnia-Herzegovina, they immediately split into factions along the lines suggested above. One faction, the socalled "Fundies" or fundamentalists, continued to resist even considering military action. They had no other answer but to stick to their naïve tabooing of armed intervention, while grave crimes ensued across Bosnia.

The other faction, the so-called "Realos" or realists (pragmatists), called for international punitive action, eventually acquiescing to most of what NATO prescribed: a very substantial and traditional military response. Driven by moralistic and humanitarian concerns, but unable to imagine a differentiated use of military instruments, the Realos could see no alternative to embracing a type of action and a role for NATO that they previously had opposed strongly.

In 1998, when the so-called red-green coalition was formed, the Realos became the German Greens' dominating faction. Soon after, in the spring of 1999, they joined their partners in government, the Social Democrats, in supporting NATO's bombing campaign against the FRY (Serbia-Montenegro). There had been allegations, which later turned out to be false that Serb regular and paramilitary forces were embarking on a major operation to drive out the Albanian population from Kosovo. In the Greens' perception this prospect weighed more than the fact that the NATO's military commitment to punishing the alleged wrongdoers had no legitimation by the UN Security Council.

Caught on the horns of a dilemma, torn between humanitarian concerns and anti-war sentiments, left and liberal political forces in many modern countries, from Austria to Australia, have, one way or the other, handed the initiative on security issues over to conservative leaders and their followers in the politico-military establishment.

# 3 Nationalist aspirations: who's got the longest?

The post-Cold War trend of development in many Western militaries is toward increased power projection and intervention capabilities, despite some substantial reductions in overall defense spending. And this development has gone forward essentially unhampered by political opposition. Reviewing the case of the UK, a British defense analyst close to New Labour, and with reference to Tony Blair's *Strategic Defence Review* (SDR), observes that:<sup>1</sup>

"[our] expeditionary capability, which aspires to be nationally autonomous, would be a balanced force for operations of choice ... This nationally autonomous force would have strategic significance. Operational autonomy is ... useful if coalition partners are various and variable ... All indications are that the Strategic Defence Review will formalize ... an expeditionary strategic concept with a primary emphasis on flexibility and strategic mobility ... Things might have been otherwise. A safe island nation might have opted for a comparatively cheap concept that emphasised territorial autonomy, or minimal defence. Or national autonomy could have been sacrificed in favour of a menu of contributions to NATO or European forces. Or the moral consciousness of a fairly wealthy, unthreatened nation could have been discharged through ground forces specialising purely in peacekeeping ... But it has not been so."

<sup>&</sup>lt;sup>1</sup> M. Codner: "Aircraft Carriers: The Next Generation?", *ISIS Briefing*, No 70, 1998, p 9.

"...Issues of the direct defence of the UK have not been central to the Review. The fundamental questions have gone beyond matters purely of defence and security. They are: 'What future role does the UK wish to play globally and in Europe?'; 'Will a relationship with the US continue to be a means to influence power events?'; and 'What instruments of national power need to be developed to fulfil this role?'. Of these instruments military capability is a strong and widely respected suit for the UK. A final and crucial question is therefore: 'How much military force is enough to command international respect and in what form will this military force be most influential?"

And, indeed, the SDR conducted by the Labour Government, did formalize an expeditionary strategic concept.

Statements similar to Codner's could be cited from other countries, NATO and non-NATO, although most (especially the official sources) are less frank about nationalist motives. All in all, one gets the strong impression that the current build-up of intervention forces is a matter of international status competition. Paraphrasing the British source's "crucial question": it is all about who has got the longest... reach or who can project more power over greater distances.

# 4 Problems with proper timing

The formation of modern intervention contingents has been indicative not so much of a growing sense of international responsibility, but rather of the continuation of national profiles and interests. This suggests that joint action by a group of states, or by a military pact such as NATO, is not easy to achieve. Very much depends on whether or not an accord can be reached and sustained at least for a period of time, and even the best developed institutional mechanisms currently available for fashioning such accords seem clumsy.

The difficulty in forging cooperation is due not only to the fact that nations may have different calculi of interests and power with respect to an intervention site, but that they also usually operate under different domestic constraints – for instance, the sentiments of their respective publics. Indeed, domestic public opinion seems to be of growing relevance in making decisions about intervention. Taking into account both factors, while trying to build an international consensus, can turn out to be a time-consuming business. The public, for instance, may be willing to send their soldiers into a conflict situation only after atrocities there have reached a high threshold; or, publics may remain reluctant until they have been convinced that there are low-risk options for intervention forces.

Besides these problems, which concern the difficulty of forming intervention regimes, there are also other complications inherent in crisis situations. Take, for example, the case of Kosovo. The media, in Europe at least, and numerous political analysts have pointed to the danger of violent escalation there ever since the early 1990s. Nonetheless, the international community did little or nothing for years – mainly for two reasons:

- ~ Kosovo is [at the time of writing, L.U.] a part of the Federal Republic of Yugoslavia (Serbia and Montenegro), which makes intervention without authorization by the UN Security Council, as required by international law, a tricky political business.
- In order to facilitate the negotiations leading to the Dayton accord for Bosnia-Herzegovina – which were a close run, touch-and-go affair – the actors involved agreed clandestinely to postpone the Kosovo question, lest it impede reaching an agreement on Bosnia.

Whatever their source, delays in addressing a crisis allow processes of conflict escalation to spiral upward unhampered. And, as the situation gets worse, the option of a modest, well-tempered application of outside military force comes to appear less and less feasible. In the end, a massive counterstrike may seem the only option. This can be taken as a kind of self-fulfilling process (or prophecy).

# 5 Focus on punitive action

When outside intervention to end an already well-developed conflict takes the form of a massive strike, such action almost automatically has the character of punishment, rather than denial. Massive strikes to stop the exchange of fire normally cannot be directed against zones where the conflicting parties are closely intermingled because such an operation would lack any discriminatory effect: the good guys would get hit as well as the bad. Instead, the strikes are directed at the military (and sometimes also the political and civilian industrial) infrastructure of the party identified as the aggressor. But often such strikes against an aggressor's back yard are perceived by the people in the target area, themselves often victims of domestic oppression, as counter-civilian retaliation or even as an attempt at merciless subjugation.

With reference to the recent history of the Near East, and to other conflict-prone areas, it has been argued that punitive or retaliatory military action is likely to evoke the desire for revenge. The development of affairs in Bosnia-Herzegovina gives evidence to this hypothesis: With the NATO air strikes of 1995 the armed clashes on the ground soon came to an end (although they were not actually over until Croat troops had driven Serb forces and civilians out of the Krayina region). Quite a few observers have considered the NATO strikes to be what prompted the peace process. Others disagree with substantial arguments. According to these voices the strikes were merely coincidental or, at least, not the main reason for the cease-fire.

They believe it was more important that the conflicting parties had already achieved most of their goals of ethnic disentanglement and that they had largely exhausted their human and material resources. Also important in this view is the fact that the Clinton administration reversed its previous position in early 1995, showing itself ready to accept the new status quo – in other words: the results of ethnic cleansing.

Seen against this background the NATO air strikes take on a different connotation. Since they were almost exclusively directed against the military infrastructure of the Serbs, it is plausible to assume that they would have the effect of deepening Serbian resentments, rather than creating the conditions for a stable peace. Such negative reactions were further substantiated when – after the insertion of IFOR (Implementation Force) and SFOR (Stabilization Force) to safeguard the Dayton accord – the Serbs gained the impression that the West, especially the US, gave preferential treatment to the Federation of Bosnia and Herzegovina (the Croats and Muslims). Today an international military presence continues to be needed to guard the peace in the Balkans. This includes the need for foreign troops in Kosovo where, in the wake of the bombing campaign against Rump-Yugoslavia, Albanian self-confidence grew to such an extent that now the Serbian minority legitimately demands protection.

There is good reason to believe that punitive action can contribute to the development of conditions that demand 'more of the same': prolonged military presence or even another massive strike, then a third, and so on. At best, punishment can momentarily, or for a very limited period of time, stop hostilities; but it is unlikely to produce a stable peace. In this way, the reliance on military punishment by means of intervention forces is likely to give violent conflict a longer lease on life. This outcome, the product of myopic policies, would neatly preserve a central axiom of realism, that influential school of political science: namely the belief that war cannot be disinvented.

# 6 Promises of high technology

Punitive strikes, which we have identified as problematic, are more likely to occur if the military culture of the intervening states centers on high-technology and the promises of its aficionados. The potential of high-technology applications appears to be greatest with respect to long-range, precision-guided fire using air-launched (stand-off) or ground-/sea-based missiles. For this reason high technology lends itself more to the improvement of strike capabilities, than to the optimization of military performance in other areas. Currently, investments in hightechnology equipment are mainly driven by three considerations:

- First, military strategists hope to minimize the collateral damage caused by punitive strikes in order to assuage public opinion and avoid challenges to the legitimacy of such strikes.
- Second, since modern societies are casualty averse (especially with respect to their own youngsters sent abroad), there is increased reliance on machines that promise to do the job from safer, standoff distances.
- Third, high-technology aficionados have successfully induced military hierarchies to believe that cutting-edge technologies make possible a quantum leap in cost-effectiveness.

These hopes are questionable, however. Many high-technology applications tend to be over-complex and, thus, susceptible to "Murphy's Law". High rates of mission capability are maintained only by Herculean maintenance efforts. Moreover, these systems, like all others, are vulnerable to counter-measures – but their high cost and long development cycles impede any quick adaptation to such counter-measures. Although the precision-guided weapons used in the 1990 Gulf War were given the highest ratings by Pentagon officials and were made to look good by militarily censored TV reports, their actual performance fell far short of initial claims and their cost-effectiveness proved quite low. In some cases – for instance, the efforts to interdict Iraqi SCUD missiles and to find their launchers – their performance was abysmal.

Admittedly, in the recent war against Iraq the large-scale use of newly introduced GPS-guided bombs (sporting satellite navigation) by the US Air Force and Naval as well as Marine Aviation led to a drop in complexity and cost. But this novel type of precision-guided munitions is not as accurate as older ones with on-board target seeking and by no means proof against counter-measures. Future conflicts with forces employing more sophisticated jamming techniques than those used by Saddam Hussein's troops may set in motion new and expensive counter-countermeasure responses.

As for the limitation of collateral damage by high-tech means: one would have to be short-sighted and narrow-minded to conclude that the picture is good. On the one hand, by Second World War standards, the rate of *immediate* civilian casualties per target destroyed was very low in the 1990 Gulf War and the Kosovo conflict. On the other hand, in absolute terms, thousands of civilians were directly killed by coalition attacks in the Gulf War; hundreds (and perhaps many more) were killed in the strikes on Serbia (in 1999). And with respect to the recent war against Iraq the number of immediate casualties has been estimated to amount to 12,000-15,000 uniformed personnel and civilians. These are not insignificant numbers, especially for relatively small countries and short wars.

Much more significant are – in certain cases – the indirect and intermediate effects of such bombings, unfolding in the days and months following the attack, which in the case of the second Gulf War involved a genuine humanitarian disaster. After this war, a team of investigators from the Harvard School of Public Health estimated that there were 70,000-90,000 post-war civilian deaths principally due to the lack of electricity for water purification and sewage treatment. Even one-tenth this number would be significant.

Also pertinent to the issue of damage limitation and costeffectiveness is the question, what was gained by these attacks? In the case of the Gulf War, the official US *Gulf War Air Power Survey* found that the campaign against "strategic" (meaning "non-battlefield") targets did not have a compelling operational impact on the battlefield. The air strikes conducted in early 1999 against Saddam Hussein's regime and his arms production facilities may deserve a better marking. They appear to have, in addition to the international arms embargo, further weakened Iraq's military potential: thus conditioning it for the successful intervention of Spring 2003 which combined strategic and tactical air assets with a powerful ground component.

In the case of the Kosovo conflict, many have said that "air power won the war". A much higher percentage of the air strikes were of the so-called strategic sort than in the Gulf War and many more of the munitions used were of the precision type – 35 percent versus eight percent in the Gulf War. But proclaiming the victory of high-technology air power ignores several relevant points.

First, the US did not achieve its goal of victory within four days, as estimated beforehand, or anything approaching it – and this shortfall imposed a high political cost. Second, rather than bringing immediate relief to the Kosovars, the over-reliance on long-range strategic attack left them at the mercy of enraged Serbian forces for 10 long weeks. Third, factors other than long-range strikes probably played as great a role in ending the conflict – if not a greater role. Among these factors were the Kosovar *ground offensive* late in the war and the mounting prospect of a NATO ground campaign, the role eventually afforded the Russians in mediating and enforcing the final accord, and the easing of some of the peace terms originally put forward at Rambouillet.

If we pay proper attention to operational effects, ultimate aims, and long-term consequences, the promises of high-technology and strategic air power advocates ring hollow. And we are reminded that in attempting to conduct truly adequate military interventions there is no substitute for human beings (inter)acting 'on the spot'. High-technology strikes, per se, cannot oust a bloodthirsty dictator, keep warring factions apart, or stop ethnic cleansing.

# 7 Expeditionary missions and their nature

Having criticized essential aspects of the current practice, let us now consider a better, more effective concept of military intervention. There are a variety of important tasks that armed interventions (above the level of traditional blue-beret missions) might undertake on behalf of the international community:

- Military back-up for economic sanctions, arms embargoes etc. (preferably only hurting a targeted regime and not the respective population),
- preventive, stabilizing deployment of troops to a country (territory) under acute threat,
- ~ evacuation of foreigners from a country torn by civil war,
- creating and defending a demilitarized zone to keep warring factions apart,
- ~ protection of humanitarian convoys,
- ~ defense of sanctuaries declared by the world community,
- ~ punitive action to end escalatory processes,
- ~ offensive retaking of territory seized by an aggressor, and
- ~ occupation of territory to keep conflicting parties under control.

With respect to this catalogue of typical military missions three interesting observations can be made:

- First, most types of missions have to do with control and protection, functions which cannot be regarded as punitive or offensive, per se. (Even if George Bush Jr's recent wars in Afghanistan and Iraq are taken into account: as developments during the last fifteen years show, international control and protection missions have occurred more often than punitive operations or acts of reconquest.)
- Second, if the functions of control and protection can be performed in an optimal manner, enhancing political stability, the demand for punitive action or reconquest is greatly reduced.
- Third, the requirements for stability would be met best if the necessary military measures are well-timed, immediately effective, and aimed at minimizing provocation.

## 8 Defensive support as a key concept

A new concept of interventionary action that is attuned to the aforementioned points is "defensive support". It derives from that school of thought known as "alternative," "non-offensive," or "confidence-building" defense.

As a mission concept, defensive support covers both protective and control functions. Its principal design insight is to structure expeditionary forces in a way that would "decouple defensive from offensive mobility". This means, on the one hand, giving troops a high degree of strategic mobility to allow for the speedy allocation of defensive combat power to the right spot at the right time. On the other hand, defensive support prescribes organizing, equipping, and training these troops for holding ground and for patrol and escort missions, tangentially ruling out the capability to move offensively under heavy fire.

Typically, defensive support would require light, mechanized infantry formations (with organic air transport) riding on wheeled armored carriers and being equipped with monitoring and countermobility gear (probably backed up by some artillery capable of firing advanced ammunition). Details concerning such a structure are available from a rich collection of recent alternative defense literature, and from some innovative armies (such as the Finnish forces) whose leadership well understands that adequate crisis response demands modern, well-tailored contingents with a strong human element rather than high-technology gadgetry.

Critics of alternative defense often have asserted that the school of thought fails to comprehend the mobility requirements of the new military era. More generally, it has been argued that the high degree of mobility necessary for intervention forces precludes the possibility of their being defensive. However, a detailed analysis shows that there are different kinds of mobility, serving different ends – force allocation, offensive, or defensive action – and that the competencies associated with each of these do not necessarily have to be combined. In other words, even with long-range intervention forces, it is possible to structurally limit offensive capabilities.

The key innovation is to combine strategic mobility, which ensures optimal force allocation, with a tactically defensive mode of force structuring and deployment. This is entirely consonant with the fundamental rationale of non-offensive or confidence-building defense. Its central principle, with roots in ancient Chinese military philosophy, is that a posture geared to directly deny aggressive aims has a much better chance of contributing to de-escalation and war avoidance than does a posture that aims to deter or defend by posing the threat of retaliatory punishment.

Recent empirico-analytical studies of historical cases have produced evidence that the outbreak of armed conflict is more likely when at least one party believes that victory is both possible and relatively easy. In other words, the war temptation is greatest when an offensive strategy or option seems to be feasible and to promise success in a relatively short time at an acceptable cost in blood and treasure.

In this light, the best strategy for defusing crises and avoiding war would usually consist of measures that make territorial conquest more difficult – time- and resource-consuming. By contrast, in most cases, threats of retaliation are not equally promising because they can provoke preemptive moves. This is not an unlikely response, if one assumes that potential aggressors believe in the feasibility of the offensive.

## 9 Political and institutional requirements

If an act of military intervention is to have a stabilizing effect, one important precondition is that it receives a mantle of international legitimacy based on overwhelming support in the world community. Without this, even good-hearted interventions are likely to precipitate a cycle of unilateral or unipolar interventions and counter-interventions, with individual nations or groups of nations simply posing their interests in universal terms. Moreover, the failure to develop a true and resilient international consensus supportive of an interventionary act is likely to make success on the ground more difficult and costly. This is because one or more of the parties to the local dispute may hold out hope of gaining some significant outside support.

A second important prerequisite to effective intervention, as we have learned, is prompt action – timeliness. However, these two preconditions taken together can pose something of a dilemma. The

broadening of the support base requires time, especially if it involves the integration of disparate national contingents and operational concepts: the more participants involved, the less likely that they will be able to act in concert in due time.

The need for legitimacy raises other difficulties as well. The legitimacy of interventionary acts has hinged on the approval or authorization of the UN Security Council. Indeed, such authorization is required by international law, especially in those cases where the intervention concerns a conflict inside the borders of a sovereign state. However, positive action by the Security Council has often been neutralized by the excessive use of the veto power given to its permanent members. This may eventually change: the admission of more permanent members to the Security Council may also involve some modification of traditional veto privileges.

Former UN Secretary General Boutros Boutros-Ghali expressed his concern, however, that the already long-overdue admission of new permanent members, along with a reformulation and differentiation of veto rights, might take more than a decade. In his view, before key countries of the northern hemisphere (especially the US) would be ready to really share power with representatives of other regions, there has to be much more progress in the process of globalization – the development of ever tighter cultural, social and economic networks – and the feeling of worldwide interdependence has to intensify considerably. But Boutros-Ghali declared that in the long-term there is no viable alternative for the world community: greater cooperation, a necessity, requires a broader sharing of responsibility and authority.

And there is one more problem. If we assume that the UN will some day be capable of better (and more legitimate) decision-making, there still remains the question of capability: does the world community have adequate means of implementation at its disposal? Currently, the UN is totally dependent on the goodwill of the member states which – particularly in cases were an armed intervention involves substantial risks – costs precious time.

Quite a few countries have earmarked selected "stand-by" armed formations (or elements thereof) for military missions authorized and commanded by the UN. In most cases, however, the governments involved have linked their commitment to restrictive conditions. In spite of this, the designation of national forces for international use represents a step in the right direction. But there is a better solution yet: the development of a permanent UN Legion.

# 10 Plea for the creation of a UN Legion

Several analysts have proposed that a standing "UN Legion" could be allocated more flexibly to potential crisis spots and tailored more adequately to the world community's needs than could a force consisting of different national elements operating under different political constraints.

Carl Conetta and Charles Knight formulated their proposal for the creation of a UN Legion in the context of a debate among experts (mainly in the US) whose concern was to provide the UN with more adequate means of military intervention. And they have been particularly inspired by a systematic presentation of the problems involved by Boutros Boutros-Ghali.

They point to the fact that it was the malfunctioning of the UN stand-by system during the Rwanda crisis that induced the Netherlands to consider the possibility of setting up a standing UN brigade. In this context their quotation from a speech, which Hans van Mierlo, then Dutch Minister of Foreign Affairs, gave to the UN General Assembly in September 1994, is of particular interest. The Minister reflected on a UN official's assessment that a *single* mechanized brigade deployed to Rwanda during the crisis might have averted the tragedy there:<sup>2</sup>

"If the deployment of a brigade could have prevented the indiscriminate slaughter of many hundreds of thousands, what then prevented us from doing so? Let us face it: the reason was that under the circumstances no government was prepared to risk the lives of its citizens ... If member states are not in a position to provide the necessary personnel, will it then not become unavoidable for us to consider the establishment of a full-time, professional, at all times available and rapidly deployable UN Brigade for this purpose: a UN Legion at the disposal of the Security Council?"

<sup>&</sup>lt;sup>2</sup> Quotation from C. Conetta and Ch. Knight: "A UN Legion for the New Era", in Kröning, V. et. al., eds., *Defensive und Intervention* (Bremen: Temmen 1998), p 20.

With the demand thus stated the future UN Legion could, according to Conetta and Knight, take on a profile as set out in the following.

# 10.1 Profile of a standing UN force

#### Personnel

The Legion would comprise 15,000 internationally recruited soldiers and civilians (on a contract basis)

#### *Force structure*

Main organizational elements would be:

- ~ 2 brigade headquarters,
- ~ 2 motorized infantry battalions,
- ~ 2 light mechanized infantry battalions,
- ~ 1 light mechanized cavalry regiment (battalion size),
- ~ 1 light armored cavalry regiment (37 light tanks),
- ~ 2 armed scout helicopter companies (18 aircraft each),
- ~ 6 field artillery batteries (eight 155 mm field pieces each),
- ~ 2 air defense companies (12 mounted air defense systems each),
- ~ 2 strong combat engineer companies,
- ~ 2 signal companies,
- ~ 2 field intelligence companies,
- ~ 2 military police (MP) companies,
- ~ 2 civil affairs companies,
- ~ 2 field logistics bases.

#### Deployment

Having two types of infantry and cavalry allows for a relatively precise tailoring of deployment packages. Most demanding would be missions aiming to protect large humanitarian sanctuaries or to separate (and disarm) warring factions. Such a mission could require the deployment of a reinforced brigade numbering up to 5,000 soldiers. This is about as many troops as the proposed Legion could keep out in the field at any one time. Among the assets of such a reinforced brigade would be 18 light tanks, 16 to 24 155 mm field pieces, 32 medium-heavy mortars, 12 mobile air defense systems, 18 armed scout helicopters, and approximately 200 other combat vehicles or armored transporters.

A brigade-sized deployment package of normal dimensions (3,300 to 3,500 persons) could be transported from its home base to a site 5,000 miles away within twelve days. This would require less than 500 C-141 sorties (and a fleet of only 36 C-141s or its equivalents). A lead element of such a force, a reinforced light mechanized infantry battalion, could be "on the spot" within only three or four days.

#### Cost estimates

The initial capital expenditures for equipping the proposed force, including base construction or renovation, would amount to approximately 1.9 billion US\$ (price level of 2003). And the long-term average annual budget for the UN Legion has been estimated to be US\$ 900 million. Incremental costs associated with field operations might add another US\$ 720 million per year. It should be noted that the estimate of these incremental expenses is for one year of full utilization. The costs of strategic lift are included (rental basis), on the assumption of two separate deployments (in each case 50 to 60 percent of the force would be transported by air).

# 10.2 Avoiding a peculiar kind of legionary's disease

The profile of the proposed UN Legion shows us a force that is somewhat dominated by infantry. And there are additional elements – such as engineers, MPs, and those for civil affairs – which also place particular emphasis on human actors and their performance. This emphasis is totally adequate because the envisaged force does not just have to be tactically and technically efficient, but also has to engage in numerous human interactions in order to have a truly stabilizing, confidence-building effect in the crisis region. Think, for instance, of soldiers who – having suppressed hostile sniper action by their own high-precision counterfire – are ordered to disarm the village where the shots had come from! In such cases very much depends on the UN soldiers' social skills, on their ability to stand firm and to avoid provocation. Such virtues could erode or might not fully flourish, however, if the members of the UN standing force develop an *esprit de corps* with a decidedly elitist touch. Of course, the UN legionnaires would quite likely constitute an elite. The question is: Will this quality be unduly emphasized or not?

In this regard, the history of the French Foreign Legion teaches an interesting lesson. In order to overcome the divisive tendencies inherent in the Foreign Legion's multi-cultural recruitment base, and to generate (as well as to maintain) the high degree of group cohesion necessary for combat effectiveness, a veritable cult of being special and superior was developed. This often led to serious problems of interaction with the indigenous civilian population in the regions of deployment. At present the Foreign Legion seems to pose less of a human relations problem than was the case during the period between 1830 (the Legion's date of foundation) and the Algerian war. The reasons for improvement may be better political control and a greater degree of professionalization.

One good thing about the concept of a UN Legion is that human relations problems can more easily be made a topic of international public concern and a subject of concerted measures aiming to minimize inappropriate behavior. It would be far more different to address similar problems in the context of a peace mission comprising various national contingents from individual UN member states. It is well known, although seldom discussed in the political area, that not all soldiers participating in UN peace operations have behaved as appropriately as, for instance, the ones from Scandinavia.

What is to be done to achieve the best results concerning the human potential of a UN Legion should be subject to further study. For now, the following short list of measures may provide a sense of direction:

- ~ careful screening of applicants,
- ~ firm politico-military control,
- introduction of an ombudsman system,
- professionalization partly linked to civilian education,
- establishment of obligatory language courses,
- ~ exercises in multi-cultural understanding,
- thorough information on potential deployment regions.

## 10.3 General assessment

Provided that the human-relations problems inherent in the creation of a UN Legion can be dealt with in a satisfactory manner, the concept is quite promising. It envisages a relatively light force that lends itself optimally to quick allocation and flexible adaptation to different environments. Its costs are by no means outrageous. Note, for instance, that of July 2004 arrears in payments of contributions to the UN peacekeeping budget amounted to US\$ 2.479 billion, of which the US owed 34 percent (US\$ 837 million)! As indicated previously, the estimated initial capital expenditures for a UN Legion would be lower then current overall arrears.

A special assessment of the Legion's fighting value shows that it has considerable bite as long as it stays on the defensive. Wherever needed it can mount a denial-type posture of respectable firepower stemming from a mix of direct- and indirect-fire weapons (in which high-precision artillery and mortars would play a key role).

A UN Legion could help overcome both the casualty aversion of modern societies and the status-seeking impulses associated with the building-up of nationally autonomous intervention forces. To the world community, notoriously lacking in resources, this option could be sold on grounds that a timely, non-escalatory insertion of adequately structured forces would promise success in peace operations at relatively low cost in blood and treasure.

## 11 Iraq and the consequences

The war against Saddam Hussein's Iraq does not fit in with a concept of stabilization which holistically combines political and military means in a non-provocative manner: seeking legitimation by the world community and being aware of problematic after-effects of an intervention. This military campaign has been praised as the "New American Way of War" and is widely regarded as the first pure application of the "Rumsfeld doctrine".

This doctrine, ascribed to the US defense minister and - along with

Vice President Cheney – key inspirer of the Iraq War, is assumed to imply that the United States should in principle be capable of going it alone: to conduct full-scale, aggressive interventions without any justification by the UN Security Council and win quickly by employing only a lean force and not needing much help from allies. (It should, for instance, be possible to go to war without being able to count on the massive assistance of a "fifth column" or local ground forces, as in Afghanistan at the end of the year 2001.)

Supposedly, the reason why such a strategic approach has found support among the (neo-)conservative elite in Washington is as follows: The members of this power group view the US as a hegemon of global reach who in relevant dimensions of influence has lost substance, as other centers of the world – Europe, China and India, for example – are in a process of political and economic emancipation.

To compensate for a relative loss of status in the economic and political sphere, the diagnosis goes on, the administration of George Bush Jr relies more than its predecessor's on the exertion of military might: boosting one's political standing by the ability and willingness to coerce, and improving one's economic position by reaching for the control of increasingly scarce natural resources.

Such an approach only makes sense if the US continues to be capable of fighting and winning encounters like the recent war against Iraq or even more challenging ones. Leaving aside the question of whether or not the aftermath of the Iraq war, strong US forces being tied down by armed resistance and terror, works as a deterrent of its own, it should be asked what the military chances are that the exercise – of armed intervention namely – could be easily repeated. To answer this question two assessments are required: of the war against Iraq and of potential future foes of the United States.

The war constituted a departure from the previous American pattern of military intervention: attempting to win through the application of strategic airpower alone. The US leadership was obviously willing to take risks: namely by committing ground forces. And these ground forces appeared to be just designed for the job, in other words, did not march into Iraq in overwhelming (numerical) strength as was customary in the US Army. Swift operations and a decisive military victory at relatively low cost in (one's own) blood and treasure were the result of three interacting factors:

- superiority of the aggressor especially through advanced technology (70 percent of all air-delivered munitions were precision guided) and the close coordination of land and air operations,
- terrain conditions favorable to the invader (relatively good main roads, no destruction of strategically important bridges, and wide alleys leading into the centers of major cities),
- inferiority of the defender as a result of a weak military infrastructure (due to the UN embargo and measures of disarmament as well as to allied bombing raids before the war) plus the demoralizing effect of a brutal and corrupt dictatorship.

But what about other potential foes? A list of countries eventually to be targeted in the future leaked out from Donald Rumsfeld's immediate entourage. It contains 20 countries which allegedly are not properly developing, not open to free trade and globalization and therefore suspected to be involved in international criminal activities, breeding, hosting and spreading terrorism or working on weapons of mass destruction.

The list comprises several weak nations and "failed states". In these cases a demonstration of US military power may just be overkill and would not much, if at all, contribute to status-boosting. Other cases on the list represent military capabilities significantly more developed than Iraq's just before the war (such as Iran and North Korea). It is not likely that these countries could be successfully invaded *at calculable risk*.

And there also are nations which, apart from their military profile, appear so complex that any attempt at taking them seems bizarre from the outset (such as Brazil and Pakistan). In other words, the number of countries focused on, that would have to plausibly fear an American onslaught, is very limited.

Sooner or later the political class in the United States may learn that hegemonic war is not an instrument lending itself to easy repetition. Of course, such wisdom would mainly stem from the violent aftermath of the Iraq war and the impression it continues to make on the American public. In the expert community, however, this insight may be increasingly substantiated by those analyses which demonstrate that the astounding victory in Iraq was the result of a rather unique constellation of factors, unlikely to be found elsewhere. As a consequence, sooner or later, the pendulum may swing back to those policies that seek international status in domestic reforms combined with a more cooperative, less dominant attitude towards the rest of the world.

In other centers of power around the globe the political elites may learn from the American experience in that they cease to merely copy the basic patterns of orientation the US Armed Forces have come up with. Europe, in particular, whose nations – either through NATO or in the context of the new Euro Army – have in vain tried to somewhat narrow the military gap vis-à-vis the US, might come to the conclusion that military power as such is not a guarantee of equal partnership. What in the end counts is whether or not a given foreign cum security policy can be supported by truly adequate means of power projection.

It is near-inconceivable that the nations forming the European Union could consent to breaking international law, calling illegal preventive war pre-emption (as was done by the US, the U.K. and Australia). What the Europeans can consent to instead (and they often do), are policies and military missions intended to cautiously stabilize crisis regions. Such an orientation would demand an increasingly tight linkage with the UN and, apart from that, a military policy along with a congenial, affordable force design of the kind suggested in this study.

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# Bibliography

Altvater, E.: "Von der Währungskonkurrenz zum Währungskrieg, 'Was passiert, wenn der Ölpreis nicht mehr in US-Dollar fakturiert wird?'" in, ÖSFK, ed., *Schurkenstaat und Staatsterrorismus*. *Die Konturen einer militärischen Globalisierung* (Münster: Agenda, 2004), pp 178-194.

Boot, M.: "The New American Way of War", *Foreign Affairs*, Vol 82, No 4 (July/August), 2003, pp 41-58.

Barnett, Th. P.: "The Pentagon's New Map", *Esquire* (Magazine), March 2003, http://www.thomaspmbarnett.com./published/pentago nsnewmap.htm. Boutros-Ghali, B.: *An Agenda for Peace: Preventive Diplomacy, Peace-making, and Peacekeeping* (New York, NY: United Nations 1992).

\_\_\_\_\_ : "Interview mit dem früheren Generalsekretär", Der Spiegel, No 2, 11 January 1999.

Bunzl, J.: "Krisenherde im Nahen Osten", in *Die Zukunft Südosteuropas, Friedensbericht* 1997, (Chur/Zürich: Rüegger 1997), pp 23-34.

Cadiou, Y. L.: *French Foreign Legion*: 1940 to the present (London: Arms and Armour 1986).

Centre for Defence Studies: *The Strategic Defence Review: How Strategic? How much of a Review?* (London: Brassey's 1998).

Conetta, C.: *The Wages of War: Iraqi Combatant and Non-Combatant Fatalities in the 2003 Conflict* (Cambridge, MA: Commonwealth Institute, Project on Defense Alternatives Monograph **#** 8, 2003).

Conetta, C. and Ch. Knight: *Vital Force. A Proposal for the Overhaul of the UN Peace Operations System and for the Creation of a UN Legion* (Cambridge, MA: Commonwealth Institute, Project on Defense Alternatives Monograph #4, 1995).

European Security and Finnish Defence, *Report by the Council of State to Parliament on 17 March 1997* (Helsinki: Oy Edita Ab 1997).

Fischer, M.: "'Krisenprävention'. Modebegriff oder friedenspolitische Notwendigkeit?", in *Krisenprävention*. *Friedensbericht* 1999 (Chur/Zürich: Rüegger 1999), pp 47-76.

General Accounting Office (GAO): *Operation Desert Storm: Operation Desert Storm Air War* (Washington, D. C.: GAO, July 1996).

Global Policy Forum 2004, http://www.globalpolicy.org/finance/tables/core/un-us-04.htm.

Grin, J.: "Krieg ohne überflüssiges Blutvergießen: Zur Legitimation von Militärinterventionen durch Technologie", in Kröning, V. et al., eds., *Defensive und Intervention*, op. cit., 43-46.

Knight, C., L. Unterseher, and C. Conetta: "Military Research and Development after the Second Gulf War", in Smit, W., J. Grin, and L. Voronkov, eds., *Military Technological Innovation and Stability in a Changing World* (Amsterdam: VU University Press 1992), pp 253-264.

Loquai, H.: "Medien als Weichensteller zum Krieg," in ÖSFK, ed., Schurkenstaat und Staatsterrorismus. Die Konturen einer militärischen Globalisierung (Münster: Agenda, 2004), pp 107-124. Lewis, W. H.: "Peace Operations. Is a Standing Force Needed?", *Strategic Forum*, No 27, 1995, http://www.ndu.edu/inss/strforum/forum27.html.

Libal, W.: "Kosovo nach dem Dayton-Abkommen", in *Die Zukunft Südosteuropas*, op. cit.., pp 141-148.

Mearsheimer, J. J.: *Conventional Deterrence* (Ithaca, N. Y.: Cornell University Press, 1983).

Møller, B. and H. Wiberg, eds.: *Non-Offensive Defence for the Twenty-First Century* (Boulder, CO: Westview Press, 1994).

MO TZU, HSÜN TZU, and HAN FEI TZU, Basic Writings of (New York, N. Y.: Columbia University Press, 1964).

Mutz, R.: "An den Verhandlungstisch gezwungen? Legenden über das Kriegsende in Jugoslawien", *Sicherheit und Frieden (S* + *F*), Vol 14, 1996, No 2, pp 124-126.

Naumann, K.: *Standortbestimmung*, *Informationen zur Sicherheitspolitik – 35. Kommandeurstagung der Bundeswehr* (Bonn: Federal Ministry of Defence, 1995).

Pichler, R.: "Im Schatten von Dayton. Kosovo, Mazedonien, Albanien", in *Die Zukunft Südosteuropas*, op. cit., pp 127-140.

Unterseher, L.: "Krieg als beliebig einsetzbares Instrument: Fehlschlüsse und Illusionen", in ÖSFK, ed., *Pax Americana und Pax Europaea* (Münster: Agenda, 2004), pp 25-40.

*\_\_\_\_\_\_\_\_ : Military Stability and European Security – Ten Years from Now* (Cambridge, MA: Commonwealth Institute, Project on Defence Alternatives Research Monograph #2, 1993).

Urquhart, Sr. B.: "For a UN Volunteer Military Force", New York Review of Books, No 10, June 1993, p 3.

Van Evera, S.: "Offense, Defense, and the Causes of War", *International Security*, Vol 22, Spring 1998, No 4, pp 5-43.

Zumach, A.: "Dayton. Ein Friedensprozess in Bosnien?", in *Die Zukunft Südosteuropas*, op. cit., pp 85-94.

# POSTSCRIPT:

#### APPROPRIATE FORCES FOR THE MIDDLE STATES

In our times, traditional interstate war is not very likely to occur. This does not imply, though, that the territorial integrity of a country has not to be protected anymore. The challenge has changed, and the military forces dedicated to deal with it must change accordingly. In quite a few regions borders are under threat of infiltration by organized crime, violent gangs, insurgents, terrorists, and the like.

Clearly, there is a requirement for effective surveillance combined with a capacity to flexibly carry out armed patrols controlling wide spaces – often with difficult terrain, or rugged coast lines. This requirement equally applies to ground, maritime and air forces.

In all three spheres mere surveillance and armed control or containment may not be enough, however. If the going gets hard, with the threat surpassing a certain threshold, there may be a need for heavier force elements, with a punch that can swiftly intervene wherever required. These forces would move within the area-controlling scheme like a deadly spider in its web.

At the same time there has evolved a growing demand for military interventions on behalf of the international community. It is the middle states, in particular, that have adopted responsibility for fostering stability in the world's crisis-prone regions.

#### 1 Tasks and transformation

The political and military elites of the middle states have well un-

derstood that supporting or enforcing peace cannot be left to a single power, a military hegemon, if grave international imbalances are to be avoided. As a consequence, quite a few middle states have embarked on policies of structurally adjusting their military forces to the tasks ahead (transformation).

Interestingly, respective measures can benefit from the fact that the building blocks, the modules, of both the forces for intervention and for domestic border protection are, in essence, quite similar. In either case the task is to flexibly and defensively cover (wide) areas, with at the same time the capability to subdue pockets of resistance in an offensive manner. What may vary is, of course, the case-related composition of the contingents to be committed. And it almost goes without saying that forces for foreign intervention do have particular requirements with respect to strategic intelligence, command and control as well as to means of transport: a challenge middle states can only meet if they develop schemes of regional co-operation.

Last, but not least: countries also have to plan and make concrete provision for contingencies in which humanitarian aid is more important than military intervention proper – or for missions that combine both lines of support. As there is a growing feeling in civil society and in the politico-military establishment that missions abroad have to assume an holistic approach, if they want to be successful.

# 2 Analysis and choice

Policies to adjust are a must. And this will cost additional money – at least for a transitional period. But in many countries public support for substantial defense spending has declined considerably. More than in the past the armed forces appear just another competitor for their government's notoriously scarce resources: enjoying no more (or even fewer) privileges than, for instance, public health, education or welfare.

On the one hand it may therefore seem legitimate to call for forces reconcilable with established resource constraints. On the other hand a well-conceived plan of transformation that truly promises to tackle the military problems ahead may give more weight to the requirements of defense and alter the resource equation. In other words, it is all about optimization. In this context there has been devised a planning tool that is intended to help bring about military change through rational choice. This tool consists of two main elements:

- A calculus that takes into account a particular country's most important, militarily relevant features such as: area, length of borders, terrain and climatic conditions, density and distribution of the population, geostrategic situation, recent conflict history, GDP along with a projection of growth, current defense spending and regional/global commitments. The outcome of such a calculation by no means determines the appropriate force structure. Its result, namely to consider a certain force composition and a limited number of equipment options, has to be reconciled with endogenous variables such as the existing force structure and weapons mix, organizational history and culture. Bluntly put, the result is not binding, but a thought-provoking (heuristic) input into a process of optimization.
- A 'menu' containing compact modules of military structure along with a choice of major weapon systems and platforms from which the military planner – informed by the calculus – can pick his preferred solution. An overview of (parts of) this menu is given below.

# 3 Organization and equipment

For several decades there has been a debate over the pros and cons of unifying the armed forces: in other words, whether or not to do away with the traditional division into services. Such an integration seems to have worked relatively well in some smaller forces. In others the results do not appear to be fully satisfactory. Very much depends on each country's specific military history and related organizational culture.

It is suggested, however, to create a *Central Service Structure* (CSS) that frees the components for military action from quite a few burdens: rendering area control more flexible and focused intervention more rapid. Ideally the CSS would comprise:

- Central headquarters with a pool of staff personnel for missions involving more than one service (or service equivalent).
- ~ Strategic telecommunications (if possible: means of access to strate-
gic intelligence).

- Electronic/radar surveillance of domestic air space (and coastal waters).
- All helicopters (except for those stationed aboard ships) in a central pool, servicing the frontline elements, along with respective training facilities.
- ~ All stationary logistics.
- Non-mobile medical facilities (including training of medical orderlies for field duty).
- ~ Facilities of higher military education (inter-service).
- Facilities for basic training (inter-service, infantry-style, short period – otherwise: 'train as you fight'), and a ...
- CIMIC-center for the preparation of personnel embarking on missions abroad.

# 3.1 Ground forces

This component is based on a modern matrix organization which comprises two categories of modules, namely *combat* and *support* elements, to be combined according to a particular mission's requirements. This can be regarded as a well-focused approach to networking. Such combinations, typically brigade- or half-brigade-sized, are commanded by staff personnel taken from a central ground forces' pool.

It is conceivable that staff personal and the selected combat cum support formations stay together longer than a certain mission requires. This would certainly be good for human bonding. But in principle, for the sake of flexibility, a re-arrangement of modules should remain possible. The combat and support elements themselves – battalion-sized – should, as a general rule, not be taken apart, however. At this level and below, human bonding as a precondition of military effectiveness is indispensable.

(To meet the requirements of an overview, not all the modules are sketched out. Each type could come in varying numbers, of course, just according to a particular country's needs. Hints regarding equipment merely serve the purpose of illustration.)

### 3.1.1 Combat modules

#### Special operations

For a variety of missions: from reconnaissance and offensive infiltration to pinpoint assault and evacuation, anti-terror action in general: 3 companies trained commando-style and for paradrop, heliborne as well as amphibious access; advanced infantry weapons and nightfighting equipment; no organic transport other than motor kites (optional), fast rubber dinghies, light cross-country motorcycles and helimobile, light armored vehicles, such as the AML M 11 or the new A4 AVL (both by the French maker Panhard).

### Protected infantry

*Purpose:* Thickening-up defenses with dismounted troops, offensive mop-up operations in covered, rugged terrain, urban warfare, show of force.

*Characteristics:* Transport with lower grade protection, good roadmobility, limited cross country-mobility, man-portable infantry weapons only, specialized for dismounted combat.

*Structure:* 3 line companies: each with 10 platforms (1 for commander, 3 platoons: each with 3 platforms, 1+8 soldiers per platform), 1 command element with 3 platforms. Total: 33 protected vehicles, dismounted strength: 256.

*Equipment:* One platform/one version: 4x4 or 6x6 truck of commercial origin with add-on armor (or armored crew container), 1 or 2 fitting into a C-130 (transport weight of vehicle between 8.5 and 15t).

*Procurement:* Many options. Interesting solutions: the Daimler-Benz UNIMOG as basis (DINGO 2), the Swiss DURO or containerized types.

### Light mechanized

*Purpose:* Area control, patrolling, showing the flag, reconnaissance, retrograde (delaying) action, preventive deployment, quick-reaction defense.

*Characteristics:* High mobility: strategic/operational/tactical, adequate mine protection and against infantry weapons/simple IEDs, versatile firepower, for dismounted and mounted operations.

Structure: 3 line companies: each with 13 platforms (1 for com-

mander, 3 platoons with 4 vehicles each, 1+4 per platform, meaning that pairs of vehicles have to be teamed to get tactically viable groups of 8). Having groups of 8 is important for 'ordinary' infantry action, but less relevant in a patrolling/cavalry/recce role. Reason for limiting personnel per vehicle: not to put 'too many eggs in the basket' (the example of full-complement patrolling with large, coffin-like PIRANHA/ STRYKER-type vehicles has not been utterly convincing).

- 1 'heavy' company for fire support: with 9 platforms (3 platoons of 3 platforms each), crew per vehicle: 3.
- ~ 1 command element with 8 platforms (4 recce).
- ~ Total: 56 platforms, dismounted strength: 156.

*Equipment:* One platform (different versions) for all purposes: military design, genuinely armored and compact (4x4), 2 fitting into a C-130 (transport weight of vehicle not exceeding 8.5t). Line version: each pair of 2 with complementary (externally mounted) armament: .50 cal. machine gun or 40 mm automatic grenade launcher. Support version: 20/25 mm machine cannon plus (optionally) 2 launch-containers for ATGMs (Anti-Tank-Guided-Missiles)/bunker breakers. Recce version: similar to support version, but telescopic mast with observation gear instead of cannon/ATGMs.

*Procurement:* Many modern options. Relevant producers to be found in Brazil, France, Germany, Italy or Switzerland.

### Heavy mechanized (optional)

*Purpose:* On the offense and defense: backbone of lighter formations, center-of-gravity operations, infantry assault/evacuation with optimal protection, controlled escalation, show of force.

*Characteristics:* Low strategic, limited operational, but good tactical mobility, optimal crew protection, firepower adequate to modern scenarios.

*Structure:* 3 line companies with 11 platforms each (3x3+2). Platforms with a complement of 3+6-8, 1 command element with 2 platforms. Total: 35 vehicles, dismounted strength: 186-248.

*Equipment:* One platform for all purposes: genuinely re-engineered on the basis of older vintage MBTs, low profile, weight: 45-60t, externally mounted armament: 20/25 mm machine cannon/ 40 mm automatic grenade launcher, ATGMs (bunker breakers) in 2-4 launch-containers.

*Procurement:* In quite a few countries indigenous improvisations seem possible (help from foreign design bureaus probably welcome, as indicated by the example of Jordan). Otherwise offers from the Ukraine, Jordan (sic!), and Israel should be considered. The Jordanian TEMSAH (Centurion-based) and the Israeli solution (on an older MERKAVAH chassis) are remarkable.

#### Heavy armor (optional)

If traditional scenarios have a comeback, for center-of-gravity operations and show of force; to be partly combined or organizationally mixed with heavy mechanized modules, 35 platforms per module; equipment: standard gun tanks (MBTs); for tanks built post 1980 (in the Warsaw Pact) or post 1965 (in the West) thorough modernization would be sufficient.

# 3.1.2 Support modules

Only a few modules have been sketched out. They are directly related to combat. Given resource constraints, there may be, in reality, less structural differentiation than indicated below.

### Security (rear area)

Suitable for mobile rear-area security operations: the light mechanized force element without its 'heavy' company.

#### Reconnaissance

Element A: Streamlined version of the light mechanized module; relatively more vehicles with telescopic sensor masts. Element B: Battle-field radar (optional) and tactical/operational drones (simple products, interesting developments in Israel).

# Artillery (rocket)

For massive fire concentration, more likely in traditional scenarios; 3 batteries, each with 6 systems; relevant developments in Brazil, Italy and the USA; for operational mobility wheeled platforms are preferable to tracked ones; if affordable: counterbattery radar, otherwise target information from reconnaissance module(s) through networking.

#### Artillery (tube)

For flexible, pinpoint fire support especially in modern scenarios; guns are to substitute for all mortars, which is possible through networking (exception: Special Operations Forces' light mortars); 3 batteries, each with 6 systems; standard caliber: 155 mm; for lack of protection: no field artillery; relevant developments: wheeled mechanized systems – such as ZUZANA (Slovakia) and CAESAR (France); if affordable: counterbattery radar, otherwise information from reconnaissance.

#### Air defense (ground-based)

Mobile, short-range air defense for the protection of high-value objects – such as nodes of infrastructure or headquarters; 3 batteries, each with 6 systems; preferably on a standard wheeled (protected) platform; combination of gun and missile system (STINGER POST plus 25-35 mm machine cannon, for instance); interesting developments in Switzerland, Germany and the USA; sensors: surveillance radar and infrared (plus laser); for robustness: decentralized pattern of organization.

### 3.2 Maritime assets

The naval forces are to be freed from quite a few burdens. This may help them excel in their traditional realm:

a) Logistics are base logistics and, as such, part of the Central Service Structure/CSS. (Should there emerge the need for high-sea replenishment, the respective platforms could have civilian manning and should sensibly be operated by the maritime forces in co-operation with neighboring navies in the region.)

b) If naval bases need immediate protection against air threat, it is to be provided by the respective elements of the ground forces: based on the mobile module with missiles and machine cannon.

c) The static sensor organization is in the hands of the CSS too. In other words, a single, unified organization is in charge of all electronic and optronic intelligence to be gathered over land and the adjacent waters: avoiding duplication and producing better results through coherent data fusion.

d) In the age of scenarios 'other than war' the round-the-clock patrolling of a country's coast lines is of prime importance. In order to get the best performance, this should be left to a specialized element, with police status in peacetime, namely the Coast Guard. (If the naval forces in question possess fast attack craft, they may give them to this organization for coastal protection: probably after having removed parts of the armament. Ship-to-ship missiles, for instance, could be used on the more solid platforms to be dealt with below.)

e) With the exception of those countries that have strong elements of naval infantry with a particularly venerable record, there should normally be no element of Marines (in the sense of standard infantry specializing in large-scale assault-landing operations). Reason: the apparent lack of plausible scenarios for such a force. There is a need for Special Operations Forces (SOF), however, capable of operating from the sea. Such elements are to be taken from the ground forces: as it is not advisable to provide each service (or service equivalent) with its own Commandos. Recent experience has shown that, if each service sports its own SOF, there could be an inter-service 'arms race' with the result of increasing quantity and cost while lowering quality.

f) In case a country has a demand for air surveillance of its coast lines and off-shore areas, the air component (air force) would be in charge: as, for the sake of an economical solution, all fixed-wing aircraft are to be operated by one unified structure.

g) Even if the maritime forces successfully patrol and control a country's off-shore waters, there may still, in certain situations, arise the need for a decisive strike. These would normally be delivered by onboard means, but in extreme cases (of threat and urgency) air power would have to be called in. The respective aircraft (light/medium fighter bombers) are to be requested from the air component (air force). This demands a particular kind of – well-practiced – networking.

As a result of such military reform the naval forces can, at last, concentrate on what renders them truly naval: namely ships. In this context three kinds of platforms are to be discussed: submarines, corvettes/light frigates, and multi-functional support vessels.

#### Submarines

In the new age the employment of submarines has been propagated on grounds that these vessels constitute stealthy, non-provocative means of reconnaissance in potentially troubled waters. And it has also been claimed that they could be used to insert SOF into unfriendly areas of interest. On the one hand their invisibility is a plus. But on the other hand it may be a minus – namely when the task is to show the flag, to supervise an embargo, to subdue fire from an unfriendly coast or to detect and interdict armed bandits in their speedboats. Seen against this background, and given the high price makers of modern submarines – Germany (U 214), France (Scorpène) and others – demand, the procurement (of considerable numbers) of such systems should be weighed against other solutions.

### Corvettes/light frigates

If a naval vessel is wanted that combines the potential of achieving both, an effective control of coastal or off-shore waters and power projection over considerable distances, and that integrates a surveillance capability with strike assets, than the choice must be the modern corvette or light frigate. This characterization applies to ships of between 1,500 and 3,000 tons standard displacement. Good examples are the German MEKO corvettes and frigates with their modular design. Other remarkable examples are the Brazilian BARROSO or the Italian Nuova Unità Minore Combattente (NUMC). Features to be demanded in the context of new conflict scenarios are as follows:

- High-performance surveillance sensors (with built-in redundancies).
- Rapid-firing 5 inch gun with precision ammunition (multi-purpose, also against coastal targets), produced in Italy.
- High-rate-of-fire machine cannon (FLIR, laser, radar control) against conventional and unconventional air threat as well as against speedboats and the like (the German MAUSER 27 mm seems an attractive choice).
- Optional: High-precision sea skimmers against seaborne and land targets, probably produced in Sweden (RBS 15 Mk.3).
- ~ Optional: A helicopter for additional surveillance and for liaison.
- ~ Optional: A capacity (speedboat) to land up to a platoon of SOF.

#### Multi-functional support ships (optional)

Maritime missions abroad can be backed up by support vessels that integrate features such as: accommodation for several platoons of SOF, transport helicopters and speedboats for operations 'from the sea', a sizeable hospital (run by personnel from the CSS medical branch), and armament for self protection or even against distant seaborne and land targets. Such platforms can be employed for both military and humanitarian missions. For the sake of flexibility, compact solutions with between 5,000 and 7,000 tons standard displacement (more ships than just one affordable!) are preferable to costly giants between 10,000 and 20,000 tons, of which often only one can be procured. A look at the market shows distinctly different design approaches. One option would be, for instance, the new Danish STANFLEX 3500, another one the Italian SAN GIUSTO class.

# 3.3 Air component

Analogous to the maritime forces, the air component is to be freed from quite a few burdens too – such as base logistics, stationary surveillance and ground-based air defense. But at the same time it has to provide services for the other force elements – such as air transport (above the capabilities of helicopters) and off-shore patrolling as well as strike missions for the maritime component. And, just like the naval forces, it can finally concentrate on what its name suggests: namely flying. In the context of modern scenarios three kinds of combat and two kinds of transport aircraft are discussed (with the former organized in squadrons of 12, the latter in squadrons of 8 or half-squadrons of 4, which also applies to maritime patrol aircraft not considered here).

# Trainer/Counter Insurgency (COIN) aircraft

Apart from machines for initial flight training (which come in great variety, but are not relevant here) there are aircraft for basic combat training that also lend themselves to COIN missions. With respect to modern scenarios these appear to be of high importance. A review of the international market suggests that there is no way around either the SUPER TUCANO (Brazil) or the PILATUS PC-21 (Switzerland), which

are both very capable prop-jet planes.

#### Trainer/light fighter bomber

As a somewhat more powerful back-up of COIN missions, for traditional Close Air Support (CAS) and for certain strike requirements (including the ones in a maritime setting), a light fighter bomber is needed which, for reasons of economy, could be its own trainer. The more recent versions of the British (BAe Systems) HAWK are likely to satisfy respective demands. But other options, such as the ones presented by the Czech Republic or Italy, should be considered too. All these jet aircraft offer higher (subsonic) speed and considerably more weapons load than the above-mentioned prop-jet models.

#### Multi-Role Combat Aircraft (optional)

On the basis of the advanced pilots' training received on the HAWK (or its functional equivalents) a first-rate Mach 2 aircraft could be procured. This is only fully justifiable, however, if there exists a very substantial air (ground or naval) threat to a particular country/region or if massive power projection is intended. For flexibility and reasons of economy it seems advisable to select a multi-role platform. Missions of reconnaissance, air-to-air fighting as well as striking at ground and maritime targets can be carried out by versions (modifications) of a single type of aircraft. A respective, cost-conscious market review suggests that there is only the choice between recent versions of the US F-16 and the Swedish JAS-39 GRIPEN. The former is somewhat more affordable than the latter, but has less potential for technological upgrades. Other advantages of the Swedish model are its take-off and landing characteristics and its serviceability in the field. (Note: Russian upgrades of Soviet vintage fighters, MiG-29, and fighter bombers, Su-27, may also be getting competitive: but only after serviceability has been improved and the flow of spare parts guaranteed.)

# Light-to-medium cargo aircraft

For tactical logistical transport, carrying troops and paradrop missions, medical evacuation and other usages, a versatile cargo lifter is needed. Many forces, those in particular that do not envisage the air transport of (light) armor, could be quite content with an aircraft such as the German-Spanish EADS CASA C-295. Indeed, its predecessor, the less capable CN-235, jointly developed with IPTN of Indonesia, may still suffice for most of the relevant tasks.

## Medium cargo aircraft (optional)

If ranges are meant to be intercontinental rather than continental, and if loads up to 17-18t are to be carried, there is, worldwide, no viable alternative to the most recent version of the C-130. It has its price and should be considered in earnest only, if rapid power projection with (however lightly) armored troops is intended.

Last, but not least two caveats: Should a country or a region come under very heavy air threat, the defender is well advised to have his combat aircraft guided by an AWACS-type system. To establish and operate such a system normally requires neighborly co-operation. And if massive power projection is intended, platforms for in-flight refueling are required (possibly in the form of converted cargo aircraft). Again this suggests some scheme of burden-sharing.

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