



ARROYO CENTER

THE ARTS
CHILD POLICY
CIVIL JUSTICE
EDUCATION
ENERGY AND ENVIRONMENT
HEALTH AND HEALTH CARE
INTERNATIONAL AFFAIRS
NATIONAL SECURITY
POPULATION AND AGING
PUBLIC SAFETY
SCIENCE AND TECHNOLOGY
SUBSTANCE ABUSE
TERRORISM AND
HOMELAND SECURITY
TRANSPORTATION AND
INFRASTRUCTURE
WORKFORCE AND WORKPLACE

This PDF document was made available from www.rand.org as a public service of the RAND Corporation.

[Jump down to document](#) ▼

The RAND Corporation is a nonprofit institution that helps improve policy and decisionmaking through research and analysis.

Support RAND

[Purchase this document](#)

[Browse Books & Publications](#)

[Make a charitable contribution](#)

For More Information

Visit RAND at www.rand.org

Explore the [RAND Arroyo Center](#)

View [document details](#)

Limited Electronic Distribution Rights

This document and trademark(s) contained herein are protected by law as indicated in a notice appearing later in this work. This electronic representation of RAND intellectual property is provided for non-commercial use only. Unauthorized posting of RAND PDFs to a non-RAND Web site is prohibited. RAND PDFs are protected under copyright law. Permission is required from RAND to reproduce, or reuse in another form, any of our research documents for commercial use. For information on reprint and linking permissions, please see [RAND Permissions](#).

This product is part of the RAND Corporation occasional paper series. RAND occasional papers may include an informed perspective on a timely policy issue, a discussion of new research methodologies, essays, a paper presented at a conference, a conference summary, or a summary of work in progress. All RAND occasional papers undergo rigorous peer review to ensure that they meet high standards for research quality and objectivity.

OCCASIONAL
P A P E R



Observations on Recent Trends in Armored Forces

David E. Johnson, John Gordon IV

Prepared for the United States Army

Approved for public release; distribution unlimited



ARROYO CENTER

The research described in this report was sponsored by the United States Army under Contract No. W74V8H-06-C-0001.

Library of Congress Cataloging-in-Publication Data

Johnson, David E. (David Eugene), 1950-

Observations on recent trends in armored forces / David E. Johnson, John Gordon IV.

p. cm.

"This paper was written for an ongoing project entitled "An Army for Full Spectrum Operations: Lessons from Irregular Wars." The project aims to assess recent "irregular" conflicts and their implications for U.S. Army force mix and capabilities, and the forces that support or operate with ground forces"—Pref.

Includes bibliographical references.

ISBN 978-0-8330-4927-8 (pbk. : alk. paper)

1. Armored troops. 2. Armored vehicles, Military. 3. Asymmetric warfare. 4. United States. Marine Corps—Armored troops. 5. Great Britain. Army—Armored troops. 6. Canada. Canadian Army—Armored troops. 7. Denmark. Hæren—Armored troops. 8. Israel. Tseva haganah—Armored troops. I. Gordon, John, 1956- II. Title.

UG446.5.J56 2010

358'.18—dc22

2010023679

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

RAND® is a registered trademark.

© Copyright 2010 RAND Corporation

Permission is given to duplicate this document for personal use only, as long as it is unaltered and complete. Copies may not be duplicated for commercial purposes. Unauthorized posting of RAND documents to a non-RAND Web site is prohibited. RAND documents are protected under copyright law. For information on reprint and linking permissions, please visit the RAND permissions page (<http://www.rand.org/publications/permissions.html>).

Published 2010 by the RAND Corporation

1776 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138

1200 South Hayes Street, Arlington, VA 22202-5050

4570 Fifth Avenue, Suite 600, Pittsburgh, PA 15213-2665

RAND URL: <http://www.rand.org>

To order RAND documents or to obtain additional information, contact

Distribution Services: Telephone: (310) 451-7002;

Fax: (310) 451-6915; Email: order@rand.org

Preface

This paper was written for an ongoing project entitled “An Army for Full Spectrum Operations: Lessons from Irregular Wars.” The project aims to assess recent “irregular” conflicts and their implications for U.S. Army force mix and capabilities, as well as for the elements that support or operate with ground forces.

Although armored forces are usually associated with high-intensity combat against the ground forces of another nation, they have clearly shown their utility in irregular warfare (IW) and hybrid warfare environments. The U.S. Army already has considerable expertise in the employment of armor in IW, using various types of armored fighting vehicles to great effect in Iraq since the fall of the regime of Saddam Hussein. Part of what the Army asked RAND Arroyo Center to do in this project was to examine how other ground forces are using armor, to see what common lessons may be emerging and to gain a better understanding of how best to employ armor in irregular and hybrid warfare situations. To that end, this paper focuses on the use of armor by other nations and the U.S. Marine Corps; the Army’s considerable experience is the subject of another research effort.

This paper summarizes the research still in progress and is meant to provide perspectives on recent trends in armored forces that might be useful in addressing issues debated in the recent Quadrennial Defense Review and follow-on efforts to determine future Army capabilities. The research results are not yet final.

The ongoing research is sponsored by the Office of the Deputy Chief of Staff, G-8, Headquarters, Department of the Army, and is being conducted within RAND Arroyo Center’s Strategy, Doctrine, and Resources Program. RAND Arroyo Center, part of the RAND Corporation, is a federally funded research and development center sponsored by the United States Army.

The Project Unique Identification Codes (PUICs) for the project that produced this document are ASPMO09224 and ASPMO09223.

For further discussion of the points raised in this paper, contact Dr. David E. Johnson, RAND Arroyo Center (telephone 703-413-1100, extension 5205; email davidj@rand.org) or Dr. John Gordon IV (telephone 703-413-1100, extension 5269; email john_gordon@rand.org).

For more information on RAND Arroyo Center, contact the Director of Operations (telephone 310-393-0411, extension 6419; fax 310-451-6952; email Marcy_Agmon@rand.org), or visit Arroyo's web site at <http://www.rand.org/ard/>.

Contents

Preface	iii
Glossary	vii

Observations on Recent Trends in Armored Forces

Purpose	1
Background	1
Note on Methodology	1
U.S. Marine Corps	1
British Army	2
Canadian Army	3
Danish Army	4
Israeli Army	5
Overall Observations	6

Glossary

AAV	Amphibious Assault Vehicle
ATGM	Anti-Tank Guided Missile
COIN	Counterinsurgency
HIC	High-Intensity Conflict
IDF	Israel Defense Forces
IED	Improvised Explosive Device
IFV	Infantry Fighting Vehicle
IW	Irregular Warfare
LAV	Light Assault Vehicle
LIC	Low-Intensity Conflict
MANPADS	Man Portable Air Defense System
MBT	Main Battle Tank
MRAP	Mine Resistant Ambush Protected
RPG	Rocket-Propelled Grenade

Observations on Recent Trends in Armored Forces

Purpose

To provide initial insights about how several ground forces other than the U.S. Army are viewing the utility of armored fighting vehicles in irregular and hybrid warfare environments.

Background

A team from RAND Arroyo Center is in the early stages of research on a project for the G-8 titled “An Army for Full Spectrum Operations: Lessons from Irregular Wars.” One of the issues under examination is how various militaries view the utility of heavy forces in IW and hybrid warfare environments. This paper describes initial findings, which will be developed further as the project proceeds.

Note on Methodology

The Arroyo team contacted representatives of the U.S. Marine Corps and several foreign militaries to gain their perspectives on the strengths and weaknesses of heavy forces in irregular and hybrid warfare. Interviews were conducted with knowledgeable representatives from the U.S. Marine Corps and from the British, Canadian, Israeli, and Danish armies. In the case of the foreign forces, the persons contacted understood that they were being asked to provide an official position of their forces that would be provided to the U.S. Army. The Australian Army was also contacted, and its input is still being awaited as of the time of this writing. Below are short summaries of the input that was received.

U.S. Marine Corps

The Marines have made extensive use of heavy forces in Iraq, starting during the major combat phase in March–April 2003. It is noteworthy that during the major combat phase the 1st Marine Division essentially fought as a mechanized division, with some 150 M-1A1 Abrams Main Battle Tanks (MBTs) and over 400 Amphibious Assault Vehicles (AAV-7s) serving as armored personnel carriers. The Army’s Bradley Infantry Fighting Vehicle (IFV) was clearly a superior fighting vehicle to the AAV-7, since the latter vehicle is designed primarily around the requirement that it be able to “swim” from Navy ships to a landing beach. That said, the

Marine Corps made extensive use of its AAVs in what was essentially an armored personnel carrier/infantry fighting vehicle role.

During movement toward objectives the Marine infantry would generally remain in their AAVs. Almost always, tanks would lead the advance, with AAVs close behind them. Once in close proximity with the enemy, Marine Corps tactics emphasized placing large numbers of dismounted infantry around their tanks, especially when operating in urban areas. Once the infantry dismounted from their AAVs, the vehicles would provide supporting fire with their 40mm grenade launchers and .50 caliber machine guns.

During the protracted counterinsurgency (COIN) phase in Iraq, the Marine Corps has made extensive use of tanks and AAV-7s. The most prominent use of heavy forces was during the November 2004 battle to retake control of the city of Fallujah, west of Baghdad. Tanks, many of which were from U.S. Army armored units attached to the Marines, played a leading role in that battle.

The Marines continued to make extensive use of heavy armor from 2005 to 2009. Tanks and AAVs were used to provide protected mobility, to provide supporting fires for dismounted infantry, and to guard convoys. Compared to the major combat operations phase of Operation Iraqi Freedom in March–April 2003, Marine armor operated in smaller units. At times, platoons of tanks, or individual vehicles, would be assigned to support infantry operations. During the major combat phase, tanks tended to operate in company- or battalion-sized units.

Marine Corps sources stated that tanks and AAVs were vital and helped minimize friendly casualties. The Marines consider tanks a major contributor to success in COIN. They noted that tanks could survive strikes from insurgent weapons that would easily have destroyed any other vehicle. For example, the Marine Corps PM Tanks office at Systems Command at Quantico cited examples of Marine Abrams that were rammed by vehicle-borne improvised explosive devices (VBIEDs). These would result in a huge explosion that swept all external gear off the tank but inflicted minimal structural damage to the vehicle; repairs could normally be accomplished within a day. No other vehicle in the Marine Corps inventory could survive such a blast. It should be noted that the AAV-7 was shown to be vulnerable during the COIN phase. In one incident a reserve Marine infantry battalion lost over 20 men when an AAV-7 stuck a large buried IED (essentially a mine) that flipped the vehicle into the air and killed all aboard.

Today the Marine Corps is working with the Army to make improvements to the Abrams that will ensure it remains a viable fighting vehicle to 2040 or beyond. The Marines are, for example, adopting many elements of the Army's Tank Urban Survival Kit (TUSK) improvements to the Abrams (the Marines currently use the M-1A1 version of the tank).

Further proof that the Marines were very pleased with the performance of the Abrams in the major combat phase of Operation Iraqi Freedom, as well as the protracted COIN phase, is the fact that the size of Marine Corps tank battalions is being increased; the Marines are adding a fifth tank company to their tank battalions.

British Army

The UK 1st Armored Division had about 120 Challenger II MBTs and a similar number of Warrior IFVs in Iraq during the major combat phase in early 2003. British Army sources said that the tanks were “absolutely vital” (a quote from a senior British officer interviewed for this report) and highly successful in combat operations in southern Iraq. Only one British

Challenger was knocked out during the major combat phase—and it was accidentally hit by another British tank.

During the COIN phase the British Army retained Challengers and Warrior IFVs in Iraq, although it emphasized light infantry operations in and around Basra. The British, like the Marine Corps, dispersed their tanks and IFVs in small groups to support infantry operations. British Army sources described their heavy units as still being vital during the protracted insurgency.

The British sources said that tanks tended to “intimidate” the enemy and noted that when tanks were around the level of insurgent activity declined significantly. The only important limitation of heavy forces was the logistical burden that they created. Challengers and Warriors were considered so valuable that they were retained in southern Iraq until British forces withdrew early in 2009. No Challengers were lost due to insurgent activity, although some were damaged. The British said that a very large improvised explosive device (IED) was needed to seriously damage a Challenger II. The British sources noted that extra armor and other equipment was mounted on their tanks during the COIN phase, bringing the weight of the vehicle to nearly 75 tons.¹

As of this writing the British Army has not deployed Challenger II to Afghanistan. When asked why not, the British Army sources who contributed to this report stated that (1) there would be logistics challenges supporting tanks in such a remote location (Helmand Province in southern Afghanistan), (2) the Canadian Army’s Leopard II tank squadron in nearby Kandahar Province has provided excellent support to British forces when needed (see the Canadian Army section, below), and (3) Warrior Infantry Fighting Vehicles were going to be deployed to Afghanistan.

During the late summer of 2009, the British Army deployed a number of Warrior IFVs to Helmand Province to provide protected mobility and additional firepower for its units operating in the increasingly violent southern region of the country. Warrior is armed with an automatic 30mm cannon and has received additional armor to reduce the threat from IEDs and rocket-propelled grenades (RPGs). According to one online British news report, the Warriors are serving as “light tanks” in southern Afghanistan.

Recent reports indicate that the British Army is going to mothball its heavy tank units for a period of up to three years in order to free Tank Corps personnel for other duties. If that decision—driven primarily by funding constraints and the need to free personnel for other COIN-related tasks—is implemented, it will mean that the heaviest armored fighting vehicle that the British Army will field will be the 30-ton Warrior IFV.²

Canadian Army

In 2000–2001, the Canadian Army conducted an important internal review intended to determine its structure for the next 15–20 years. At that time a decision was made that the Army’s

¹ Telephonic interviews with British Army personnel at Fort Leavenworth, Kansas, and the Headquarters, Royal Tank Regiment, in the United Kingdom, Summer 2009.

² Dave Pugliese, “Afghan War Sidelines British Tanks,” *Ottawa Citizen*, July 5, 2009. As of January 2010: <http://communities.canada.com/ottawacitizen/blogs/defencewatch/archive/2009/07/05/afghan-war-sidelines-british-tanks.aspx>

old German-built Leopard I tanks would not be replaced when they wore out—the Army would move to a light-medium structure with vehicles of the Light Assault Vehicle (LAV) type being the heaviest element of the Army. The Canadian Army sources interviewed for this paper stated that the experience in southern Afghanistan completely changed the Canadian Army's perspective on heavy forces.³

As Taliban resistance strengthened in 2006, the Canadian forces in southern Afghanistan found that their LAVs were inadequate for the missions they had to perform. The 25mm gun on their LAVs was not powerful enough for some targets, such as well-constructed buildings, and the vehicles did not have sufficient protection against the mines, mortar fire, RPGs, and recoilless rifles that the Taliban was using. Furthermore, per press reports, the heavy Canadian LAV-III wheeled vehicles (similar to U.S. Army Strykers, but with a 25mm cannon rather than a .50 caliber machinegun) were often confined to operating on roads, because their high ground pressure can cause them to become mired when they go off road. As Canadian casualties rapidly mounted, the commanders on the ground requested that tanks be dispatched; a squadron (company) of Leopard Is was sent and very quickly became a key unit in southern Afghanistan, supporting Canadian, Afghan, and British forces.⁴

The Canadian Army initiated a crash program to buy surplus German and Dutch Leopard II MBTs (a much better protected and armed vehicle compared to Leopard I). The first Leopard IIs were dispatched to Afghanistan in early 2008 and have been even more successful than the older vehicles. Canadian Army sources said that the introduction of tanks to Afghanistan has been a major success. Like the Marine Corps and British Army, the Canadians employ their tanks in small groups, generally in support of infantry operations. The Canadians also stated that tanks intimidate insurgents, noting that convoys were far less likely to be ambushed if tanks were present. Only three Canadian tanks have been seriously damaged in Afghanistan: one Leopard I and two Leopard IIs. Only one tank crewman has been killed. Additionally, tracked vehicles have lower ground pressure than LAVs, enabling them to work off road (and to retrieve stuck LAVs).

The experience in southern Afghanistan has convinced the Canadian Army that armored forces have a very important role in COIN operations. The Leopard II tanks currently operating in Afghanistan have been modified with improved armor (in particular, all-around metal skirts to detonate RPG shaped-charge warheads) and improved crew-comfort items, such as cooling systems to cope with the intense summer heat.⁵

Danish Army

The Danes have a battalion-sized battle group in southern Afghanistan, attached to the British forces in Helmand. The Danish unit is a mix of light infantry and mechanized companies, plus logistics and support units. A platoon of Leopard II MBTs is also included in the battalion. These Danish tanks (as well as the Canadian tank squadron in nearby Kandahar province) are

³ Canadian Army representatives at the Military Attaché office in the Canadian Embassy in Washington, D.C., provided many insights included in this section.

⁴ Interviews with Canadian Army personnel in Kandahar, Afghanistan, January 2007.

⁵ "Canada Anticipates Larger Counterinsurgency Role for Armor," *Defense News*, April, 20, 2009.

the heavy armor support for the British brigade in southern Afghanistan. Danish tanks were first sent to Afghanistan in 2007.

The Danes have employed their tank platoon as a unit, or as individual vehicles, depending on the situation. The Danish Army sources said that tanks have been very successful in Afghanistan. They provide protection and firepower unequalled by any other system. As was the case with the Marines, the British, and the Canadians, the Danes said that tanks definitely intimidate the insurgents. The main limitations of tanks are their inability to get into mountainous areas and their considerable logistical burden. The biggest threat has been IEDs, which at times requires the tank and mechanized units to bring engineer support when they go on operations. However, the Danes noted that it takes a very large, hard-to-emplace IED to seriously damage a Leopard II.

The Danes also stated that the 120mm gun on the tank is such an accurate weapon that it helps minimize the possibility of collateral damage and civilian casualties. They also noted that tanks can respond very quickly when contact is made with insurgents, and that it was clear the Taliban respects tank firepower. Indeed, it was stated that Taliban activity drops considerably when tanks are operating in an area.

Israeli Army

The Israeli Army, of all the militaries thus far discussed, is the only one with recent experience in hybrid warfare, defined by defense analyst Frank Hoffman as a “blend of the lethality of state conflict with the fanatical and protracted fervor of irregular war.” In the 2006 Second Lebanon War, Israel faced in Hezbollah an opponent with a modicum of training, discipline, organization, command and control, and advanced weapons (e.g., ATGMs, MANPADS, RPGs, mines, and IEDs).

For several years before the 2006 Second Lebanon War, the Israeli Army was focused on what it calls low-intensity conflict (LIC), particularly in dealing with the intifadas, whose suicide bombers caused numerous civilian Israeli casualties. Heavy units (tank and mechanized infantry) played little, if any, role in these operations. Armored unit training was neglected because heavy forces were deemed largely irrelevant in LIC. The 2006 Lebanon War against Hezbollah changed this perception.

After the 2006 Second Lebanon War, the Israel Defense Forces (IDF), particularly the Army, reoriented their training. They went, in their words, “back to basics” after years of focusing almost exclusively on LIC and trained extensively on high-intensity combat (HIC) skills, particularly joint combined arms fire and maneuver.

The IDF also rethought the role of heavy forces and concluded that armored vehicles would play a critical role in hybrid conflicts. Consequently, the IDF began replacing their more vulnerable older tanks and armored personnel carriers with newer models, e.g., Merkava IV MBT and heavy IFVs, based on a Merkava tank chassis (the Namer). Additionally, the Israelis have armor kits specifically designed to make these armored vehicles more resistant to IEDs, e.g., v-shaped belly armor.

In December 2008, Israel initiated Operation Cast Lead in Gaza. Initial air strikes against Hamas targets were followed up by a ground invasion. Operational results during Cast Lead demonstrated that the IDF was markedly better prepared for combined arms combat opera-

tions than it had been during the 2006 Lebanon War, and ground forces played a critical role achieving Israeli objectives.

The force mix in Gaza also shows that the Israelis believe that heavy forces are relevant and necessary in facing irregular challenges like those in Gaza or Lebanon. Of the four principal ground maneuver brigades, two were infantry (Givati Brigade and Golani Brigade), one was armored (401st Tank Brigade), and one was airborne infantry (Paratroopers Brigade). Heavy armored vehicles (tanks, IFVs) were used in all of these brigades and provided the Israelis with the ability to conduct protected maneuver and direct fire in an area presumed to have large concentrations of mines, snipers, and RPGs. Tracked vehicles also enabled the Israelis to operate off road, where they expected the majority of IEDs and mines. Engineer and logistical units also used armor for protected mobility near the front-line fighting. Finally, heavy armor provided an important intimidation factor.

Overall Observations

- In the views of the U.S. Marine Corps and the countries we have thus far assessed, tanks and IFVs have proven very useful in IW, including the COIN environments in Afghanistan and Iraq.
- Modern tanks (or heavy IFVs based on tank chassis like those employed by Israel) provide higher levels of survivability, lethality, and off road mobility than wheeled armored vehicles (Strykers, LAVs, or MRAPs).
- Heavy forces—based on tanks and infantry fighting vehicles—are key elements of any force that will fight hybrid enemies that have a modicum of training, discipline, organization, command and control, and advanced weapons (e.g., ATGMs, MANPADS, RPGs, mines, and IEDs). Light and medium forces complement heavy forces in hybrid warfare, particularly in urban and other complex terrain, but they do not provide the survivability, lethality, or mobility inherent in heavy forces. Quite simply, heavy forces reduce operational risks and minimize friendly casualties.
- Heavy forces do generally pose greater logistical requirements than light or wheeled armored forces.
- Task organizing heavy and light forces at battalion or lower levels, in ways not dissimilar from the U.S. Army in Northwest Europe in World War II, seems highly effective in the distributed warfare conditions that often characterize IW and hybrid warfare.