

**Murphy's Law:
Clausewitzian Friction
on the Modern
Battlefield**

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The Cornwallis Group
session at
31 ISMOR
Royal Holloway, UK
July 2014

Sir Michael Howard

“No theory could be of any value, he [Clausewitz] maintained, that did not take account of these interconnected elements—the uncertainty of all information, the importance of moral factors, and, lending emphasis to both of these, the unpredictable reaction of the adversary.”

The late Sir Michael Howard, *Clausewitz*, the Past Masters series, Oxford University Press, 1983; pp. 23 and 24.

The Clausewitz statement, to which Howard referred, is “They [‘...those writers who did believe it possible to study war as a science and to lay down immutable principles for its conduct...[T]heir ideas had,...thought Clausewitz, been grossly misleading.’] aim at fixed values; but in war everything is uncertain, and calculations have to be made with variable quantities. They direct the inquiry exclusively towards physical quantities, whereas all military action is intertwined with psychological forces and effects. They consider only unilateral action, whereas war consists of a continuous interaction of opposites.”

OR

Why is 'analytic' war different from
real war?

OR

Why can't models be validated?

OR

Is Murphy still alive and well on the
battlefield?

War vs. Analysis

- Don't understand synergy
- Inadequate tools
- Insufficient data
- Incorrect interpretation of data
- Focus on 'things'
- "Technological romanticism"
- Neglect human behavior
- All of the above

There is often considerable difference between our predictions (analyses) of the battlefield & the reality of the battlefield. Some reasons for the difference: We don't really understand the synergy among battle systems (weapons, communications, information, morale, etc.); Our tools for analyses--particularly combat models--are inadequate; We make do with incorrect or incomplete data; We interpret data we have incorrectly; We focus on 'things' (gadgets) rather than people. Perhaps all these reasons combined in different ways.

Technological romanticism comes from an essay of Dr. Antulio J. Echevarria II, "American Strategic Culture: Problems and Prospects," in *The Changing Character of War*, product of the Oxford University project of the same name.

The Reality of War

- **SNAFU**
- **SUSFU**
- **TARFU**
- **FUBAR**

Some of you may recall a fine product of World War II: SNAFU. How many remember the corollaries: SUSFU, TARFU, & FUBAR?

Questions About Friction

- Why should we be interested?
 - War is a human endeavor
 - Machines are managed by humans (for the present)
 - Fascination with technology
- What is battlefield friction?
 - Clausewitz unique
- Is friction analyzable?

Understanding or being aware of Clausewitzian Friction may contribute to a better understanding of our analytic concerns and hence may lead to improvements in our analyses.

Why is it called Clausewitzian Friction? Probably because only Clausewitz, of all the strategists and contributors to the art of war from Sun Tzu through the 19th Century, identified and defined the concept as a significant characteristic of war.

How did he come to do that? Perhaps he was just a very smart guy and he knew and learned from some other very smart guys. Or maybe he just had a smart wife, since she was the one who pulled his writings together after he passed away!

What Are You Going to Hear

- Brief background & definition of Clausewitzian Friction (CF)
- Examples of CF on the battlefield (writ large), including technology advances
- Where do we go from here?

Presentation focuses on examples of friction, over time.

What About *Vom Kriege*

- Well known?
- Well read?
- Who was Clausewitz?
- Universality of his work?

I'm not going to ask how many of you have read *Vom Kriege* or even how many of you have heard of Clausewitz. I don't know who said it but there is an observation that Clausewitz is the most quoted and least read of all the strategists. Sir Michael Howard, the distinguished military historian and strategist said, after citing contributions of Sun Tzu, Jomini, Liddell Hart, J.F.C. Fuller, Marx, Engels, Lenin, Trotsky, Thucydides, and Machiavelli to the study of war, that: '...there is no systematic study comparable to that of Clausewitz.'

His active military career was equal to that of the French Revolutionary and Napoleonic Wars (1792-1815). Born 1780; 1792 commissioned in 34th Inf Regt (a source says he was a Lance Corporal). 1801 to the War College; graduated at head of the class in 1803; became close to Scharnhorst, a leading figure in the Prussian Army and mentor of Clausewitz. Involved in the revitalization of the Prussian Army after its defeat by Napoleon in 1806. He resigned his commission when Prussia was forced to contribute forces to Napoleon's army and accepted a staff appointment in the Russian army, 1812. Returned to the Prussian army prior to Waterloo. In 1818 he became Superintendent of the War Academy where he was able to devote much time to composing his ideas on war, derived from his experiences and reading of history. By 1827 most of his ideas were firmed up in his notes, which were incomplete in the sense of a solid treatise on war. He also wrote campaign

histories during this period. While on duty as Inspector General of the Silesian artillery, Clausewitz was a victim of the cholera epidemic that was so damaging in 1831. He died of a heart attack brought on by the cholera, 16 November 1831.

Sources of Friction, 1812

- Insufficient intelligence
- Rumors
- Uncertainty about own strength
- Exaggeration of own difficulties
- Expectations vs. realities
- Difference between actual and theoretical (paper) strength
- Logistic difficulties
- Lack of will when confronted with battlefield realities

Clausewitz first mentioned “friction” as a concept related to military operations in 1806; developed further ~25 years; culminating in his book *Von Krieg* (On War), posthumously published by his wife in 1831..

Friction, 1831

Everything in war is very simple, but the simplest thing is difficult. The difficulties accumulate and end by producing a kind of **friction** that is inconceivable unless one has experienced war...Countless minor incidents—the kind you can never really foresee—combine to lower the general level of performance, so that one always falls far short of the intended goal. Iron will-power can overcome this friction; it pulverizes every obstacle, but of course it wears down the machine as well... Friction is the only concept that more or less corresponds to the factors that distinguish real war from war on paper. The military machine—the army and everything related to it—is basically very simple and therefore seems easy to manage. But we should bear in mind that none of its components is of one piece; each part is composed of individuals, every one of whom retains his potential of friction...The dangers inseparable from war and the physical exertions war demands can aggravate the problem to such an extent that they must be ranked among its principal causes...

Full-blown concept of Friction in the version of Vom Kriege, published by his widow following his death, from Book One, On the Nature of War, Chapter 7, Friction in War. Note: there is no mention of the 'fog of war.'

‘If one has never personally experienced war, one cannot understand in what the difficulties constantly mentioned really consist, nor why a commander should need any brilliance and exceptional ability. Everything looks simple; the knowledge required does not look remarkable, the strategic options are so obvious that by comparison the simplest problem of higher mathematics has an impressive scientific dignity. Once war has actually been seen the difficulties become clear; but it is still extremely hard to describe the unseen, all-pervading element that brings about this change of perspective.

‘Everything in war is very simple, but the simplest thing is difficult. The difficulties accumulate and end by producing a kind of friction that is inconceivable unless one has experienced war. Imagine a traveler who late in the day decides to cover two more stages before nightfall. Only four or five hours more, on a paved highway with relays of horses; it should be an easy trip. But at the next station he finds no fresh horses, or only poor ones; the country grows hilly, the road bad, night falls, and finally after many difficulties he is only too glad to reach a resting place with any kind of primitive accommodation. It is much the same in war. Countless minor incidents—the kind you can never really foresee—combine to lower the general level of

performance, so that one always falls far short of the intended goal. Iron will-power can overcome this friction; it pulverizes every obstacle, but of course it wears down the machine as well. We shall often return to this point. The proud spirit's firm will dominates the art of war as an obelisk

That was then; This is now

- Changes from earlier times
 - Technology
 - Command & Control
 - “Total battlefield awareness”
 - Smart munitions
 - Drones (autonomy)
- Friction is a two-way street
- On to some history

Clausewitz experienced war during the late 18th and early 19th centuries. His philosophy derives from that experience and his analyses of the wars of his time. Is friction alive and well on today's battlefields? Or has new technology--for example, total battlefield awareness--done away with Clausewitzian Friction?

A first observation is that friction is a two-way street: it affects the enemy as it does you--and that what counts is differential friction: the difference between the effects of your friction on you and the effects of his friction on him.

Before dealing with the question of change brought about by technology, let's look at some examples of friction on the battlefields of the past.

War of 1812

- Chippewa Creek, NY, July 1814
 - Great Britain: ~2100 seasoned troops; Riall commanding
 - US: ~2100 soldiers, **gray uniforms**; Scott commanding
- Riall expected militia
- Scott: well trained bde
- Riall: “Those men are regulars, by God!”

The Long Gray Line came into being about in 1815, so, although not authenticated, the gray dress uniform of the USMA cadets may well be in commemoration of Winfield Scott’s victory with his brigade dressed in gray because the contractor providing the uniforms ran out of blue dye. Alternatively, the Academy may have suffered from the same contractor problem that affected Scott’s brigade!

US Civil War: Chancellorsville

- Spring, 1863
 - Revitalized Army of the Potomac
 - Not-so revitalized Army of Northern Virginia
- Hooker: Excellent plan for double envelopment
 - Pressure from Fredericksburg
 - Lee forced to divide his army
- Lee
 - Holding force at Fredericksburg
 - Detached Jackson's corps for flank attack

In January 1863, after a very bad command performance at Fredericksburg, VA, Burnside was replaced as commander general, Army of the Potomac. 'Fighting Joe' Hooker was given command; the nickname came about by a typesetter's accident & Hooker didn't particularly like it. Hooker was an admirable staff man; during the winter quarters there were significant improvements in food, clothing, equipment, training, and hygiene for the troopers of the Army of the Potomac. The same could not be said for the Army of Northern Virginia, also in winter quarters; shortages of clothing, shoes, food, and equipment persisted. By spring, the Army of the Potomac was not only well-rested and better equipped with positive changes in morale, but it was also considerably larger than the Army of Northern Virginia, perhaps about twice as large.

Hooker's plan for the spring offensive can be designated a double envelopment or pincer attack, with roughly equal forces attacking Lee's army from the north (vicinity of Chancellorsville) and from the east (Fredericksburg). At the outset, the eastern front was to be a holding force to pin down major elements of the Army of Northern Virginia.

Lee's counter was to recognize the limit of the holding force & thus leave only a minimal force to face the Union troops at Fredericksburg & to be more aggressive in facing the assault from the north.

Chancellorsville (concluded)

- Hooker
 - Stunned by near-miss shell
 - Failure of aggressive action at Fredericksburg
- Jackson
 - Forced march across the front
 - Attack of Union right flank
- Three instances of CF!
 - Hooker: lack of focus & will
 - Jackson's Corps took too long
 - Jackson: a victim of fratricide

Hooker became hesitant, re-thinking and questioning his fine plan--which was still a good one. By being hesitant and second-guessing himself, he lost the advantage. The aggressiveness of the Confederate leadership, including the masterful splitting of the Army of Northern Virginia, in the face of the enemy, and the march across the enemy front by Jackson's corps to the right flank of the Union force further degraded the Union effectiveness.

Hooker 'lost the bubble' as we say today. In addition he also was wounded or at least stunned by a near-miss artillery round, and failed to transfer command or others failed to take command during his 'time out.' Whatever the case, an excellent plan failed because of loss of focus and will.

Another demonstration of friction came out of the same battle. Elements of Jackson's Corps, while moving to the right flank of the Union force, were surprised by a Union cavalry unit--an unexpected (on both sides) meeting engagement. The word spread that Union cavalry were in the area. Jackson and others of his command element reconnoitered in front of the Confederate line, when the flank attack slowed in the early evening. Forward troops were not well-informed of the movement of the leadership. When Jackson's party began to return to the lines, the forward infantry troops heard the horses coming through the brush from the direction of the Union lines, assumed the presence of Union cavalry and opened fire. Among others, Jackson was seriously wounded--a casualty of friendly fire. After amputation of his left arm, while

recuperating, Jackson took ill with pneumonia (a common occurrence among seriously wounded soldiers) and died. Fratricide is a significant component of and contributor to friction on the battlefield.

Pearl Harbor 7 December 1941

- About 100 civilian casualties
- About 2/3 died
- “Most of the civilian casualties were caused by Navy five-inch antiaircraft shells that exploded on the ground after failing to detonate in the air.”

COL Stanley L. Fask (AUS, ret.), “The U.S. Army and December 7, 1941,” *Army*, February 2013, pp. 50-58 (reprinted from *Army*, December 1991).

World War II

- Kiska Island, August 1943
 - 24 KIA, 50 WIA
 - No enemy on the island!
- Operation Cobra, July 1944
 - Normandy breakout
 - ~600 casualties from USAAF bombers (dropped short)
 - LTG McNair KIA; highest ranking fatality in the war

Kiska Island assault by US Army element; hit the beach firing weapons. Encountered some mines—caused some casualties but the bulk of the casualties were self-inflicted. No Japanese forces remained on the island!

Operations Cobra. Eisenhower, reluctantly, permitted the use of heavy bombers to precede the ground force assault. Originally, the plan called for bombers to fly along the forward edge of troops, sufficiently clear of US forces to safely drop on German troops. Unbeknownst to the Supreme Commander, the AAF changed the route to call for the bombers to fly over the US troops (at right angle to the planned route). Bombers dropped short, causing casualties to the lead battalion (a crack unit assigned to lead the assault). The attack was called off and re-scheduled for the next day. McNair went forward to be with the lead element (the same battalion!). The bombers followed the same path & dropped short again, causing more casualties.

We Were Soldiers Once...And Young

- November 1965, Ia Drang
 - Bleeding of Air Cav (1/7 Bn)
 - Moore's instructions to Cy COs re: ammo
- Spec. 4 Bungum (grenadier)
 - Went in with Bravo Cy (1st unit with Moore)
 - Half the basic load; quickly exhausted
- Why, after Moore's emphasis?
 - Scheduled R&R
 - No chopper for An Khe
 - Distributed his 40mm grenades

Moving forward to the Vietnam War and a present-day popular film story--We Were Soldiers Once--the name was changed from the original title: We Were Soldiers Once--And Young. The story covers two parts of the first fight of the 1st Air Cavalry Division in Vietnam--a fight that both the US Army & the NVA were looking for, the former to put to the reality test the airmobile concept and the latter to see if they could counter the new concept.

Ia Drang valley, morning of 14 November 1965, arriving at LZ X-Ray, 1st Battalion, Seventh Cavalry, LTC Harold Moore commanding. Characteristics: well-trained, well-schooled, solid plan for air assault, clear understanding of the commander's intent, high cohesion and moral. Helluva fight: victory!

Ia Drang valley, morning of 17 November 1965, route march to LZ Albany, 2nd Battalion, Seventh Cavalry, LTC Robert McDade, commanding officer. Characteristics: not as well-trained (at least in air assault operations), poor cohesion, poor plan, new CO, not prepared for surprises, poor understanding of commander's intent. Helluva fight: defeat(?)

Desert One

- 4 Nov 1979: US Embassy, Iran seized; hostages taken
- Carter: many alternatives; rescue mission approved
- Plan: 4 Services, 8 helos, 12 a/c
- Desert One landing site
 - No radar <3,000 feet
 - Helos directed to fly @ 200 feet
- Helos
 - Dust, hydraulics, mixed crews
 - Minimum needed: 6
 - Available: only 5

US Embassy, Tehran, Iran seized by revolutionary guards; 52 hostages (embassy staff and USMC security unit).

Special Forces Operational Detachment - Delta (Airborne) alerted[?]

Multiple alternatives examined by President Carter and advisors; early on rescue mission not included; sanctions, diplomatic mostly. Later, rescue mission added. CIA excluded from plan but agents played a role later. JCS instructed to prepare plan (did Bay of Pigs memory play a role in decisions?)

Plan involved all 4 services, 8 helicopters (USMC RH-53 Sea Stallion), 12 fixed wing aircraft (4 MC-130s, 3 EC-130s, 3 AC-130s, & 2 C-141s).

1st night: 3 MC-130s to Desert One (some hundreds of miles from Tehran); deliver Delta Force, Combat Controllers, & translator-truck drivers.

3 EC-130s to bring in fuel for helicopters. Helicopters, from USS Nimitz, refuel & fly Delta Force to Desert Two, about 50 miles from Tehran. Delta marry up with agents who will lead Delta to safe house. Helicopters move to another remote spot & await call.

2nd night: MC-130s & EC-130s transport 100 Rangers to Manzariyeh Airfield; Rangers to take & hold field for 2 C-141s (to ferry hostages out). 3 AC-130s to provide cover, support Delta assault on embassy, & suppress Iranian AF from Mahrabad Airbase. Delta to assault embassy & free hostages; rendezvous with helicopters at football stadium; fly to Manzariyeh; transfer to C-141s & fly

out. Helicopters to be destroyed.

Desert One (concluded)

- Mission aborted; hovering helo struck EC-130; both on fire
- Casualties & confusion
 - 8 KIA; multiple WIA
- No destruction of a/c & equipment;
- Iranian intel learned about plan; local agents at risk
- Problems
 - Timetable went awry
 - AWS predictions poor
 - Mixed crews
 - Poor preparation & training

Earlier (1 month), Desert One landing site laid out by USAF controller; CIA aircraft (Otter). Pilot reported radar at 3,000 feet but nothing below.

However, helicopter pilots ordered to fly not more than 200 feet. Rotors churned up dust. Flight ran into dust storm. Two helicopters lost contact with flight and landed (one source reports that the two returned to the Nimitz). Another helicopter had a warning light & landed; one source reports that the crew was picked up but the aircraft were now running 20 minutes behind the formation. One source reports that the two that had landed earlier took off and continued to Desert One but another aircraft had malfunctions and did turn back. In any event, six helicopters did arrive at Desert One. Six were specified as the minimum number for the operation, considering payloads, etc. Mission was now running late.

During refueling, one of the helicopters lost its hydraulic system & was grounded, leaving on 5. Insufficient for mission. Mission aborted.

Preparing to move out after refueling, one helicopter maneuvering in hover in a cloud of dust. Pilot was following a flashlight on the ground to get to a touchdown site. Pilot thought man with flashlight was a combat ground controller; most likely he was a C-130 crewman checking his aircraft; he may have been trying to get away from the dust kicked up by the helicopter. In any event, the helicopter's blades clipped the C-130's wingtip & ignited the fuel there. 5 on the C-130 and 3 in the helicopter died.

The Gulf War (Barry Watts)

- Targets (1st Gulf War)
 - Intelligence: 8 nuclear targets
 - Post war: 39 nuclear facilities
- Weather
 - 2nd & 3rd night: >50% F-117 strikes aborted or unsuccessful
 - 2nd day of ground campaign: all F-117 strikes grounded
- Surprising number of US fratricidal casualties

What about today? Does modern technology eliminate or reduce friction on the battlefield? Barry Watts, once Director, OSD PA&E, attempted to provide some answers in *Clausewitzian Friction and Future War*. Watts was a F-4 pilot during the Vietnam War, taught philosophy & mathematical logic at the AF Academy, served two tours with Andy Marshall in Net Assessment, and for 3 years was a Soviet threat specialist on the Air Staff. Later with Northrop Grumman he was responsible for analysis of military capabilities, operational doctrine, and strategy. He headed the Gulf War Air Power Survey's task on operations and effectiveness. Watts is now with Andy Krepinevich's outfit.

'American military officers today most often refer to Clausewitz's unified concept of a general friction...as the "fog and friction" of war. The diverse difficulties and impediments to the effective use of military force, that those possessing military experience instinctively associate with this phrase, are generally acknowledged to have played significant roles in most, if not all, of the wars since Clausewitz's time...'

Footnote: 'The March 1992 edition of *Air Force Manual 1-I: Basic Aerospace Doctrine of the United States Air Force* states that war is characterized by "fog, friction, and chance." The reigning view in the U.S. Army is that "[a]mbiguity, uncertainty, fog, friction, danger, stark fear, and chance...continue to describe accurately the conditions with which military forces have to contend and will continue to contend' (General Gordon R.

Sullivan and LTC James M. Dubrik, "Land Warfare in the 21st Century," Strategic Studies Institute, U.S. Army War College, 4th annual conference on strategy, February 1993, 26). Also see U.S. Marine Corps, *Warfighting*, Fleet Marine Field Manual 1, 6 March 1989, 4-7'

Afghanistan

21 December 2009

- UK Patrol Base Almas, Sangin, Helmand
- Night, huge Taliban bomb
- Platoon fighting off attack
- US Apache gunships arrived
- One fired 200 rounds into the base - despite the flagpole, machine gun, barbed wire and men in uniform
- Two strafing runs
- 1 KIA, 6 WIA

LCpl Roney of 3rd Battalion The Rifles, died from head injuries he suffered while manning a position at Patrol Base Almas, in Sangin, Helmand, on December 21 2009.

As night fell, the base was rocked by a huge Taliban bomb and the platoon based there were fighting off an attack when, without their knowledge, two US gunships were called in to help.

But one fired 200 rounds into the base - despite the flagpole, machine gun, barbed wire and men in uniform - as the air crews believed it was an enemy position and carried out two strafing runs.

There was harrowing evidence from soldiers on the ground, who could not understand where the devastating onslaught was coming from.

What Happened? Coroner's Investigation

- Engaged unit did not request air support
- Misinterpretation of aerial photos (1 from a UAV)
- Patrol base not on maps
- Incorrect grid references
- Apache crews told no friendlies in vicinity
- "...misplaced assumptions & beliefs became fact & opportunities to reflect & change a course of events were not taken."

Senior British Army staff - not based in Almas - liaised with the Apaches and mistakes were made when the crews were given a series of grid references and told there were no friendly forces in the vicinity.

There was also confusion over pictures relayed from two cameras - one of which was mounted on an unmanned drone.

Statements from the four unnamed pilots and co-pilots were read out during the inquest.

The Apache crews did not know the exact location of Patrol Base Almas, which was not on official maps.

Members of the Battle Group (North) Operations Room saw pictures beamed from a camera on an unmanned drone, which showed the base.

Mr Winter said: "They had misinterpreted the imagery and rather than observing what they interpreted as an insurgent location, they were in fact viewing Patrol Base Almas and used this information to guide the attack helicopter crews to this location."

Soldiers at Almas were firing mortar illumination rounds into the night to light up the battle zone - but this was detected on mortar-locating radar and mistaken as insurgents firing at the Allies.

Separately, staff at Forward Operating Base Nalay - near Almas - watched the scenes unfolding on a camera system, but they failed to recognise the base as its appearance changed following the Taliban bomb.

Mr Winter said: "They informed the company commander and the company second-in-command that they had positively identified insurgents with rocket propelled grenades."

The coroner said soldiers at Almas were in control of the fire fight and did not request air support.

Friction Limited to War?

Agent may have seen colleague as smuggler

Phoenix – A Border Patrol agent killed in an apparent friendly fire incident in Arizona may have shot and wounded a colleague after mistaking him for a drug smuggler in the dark, sparking return fire, a lawyer for the wounded agent said.

Nicholas Ivie, 30, was killed last week while responding to a tripped ground sensor in a well-known smuggling corridor near the U.S. border with Mexico. A second agent was wounded in the incident and a third was unharmed.

Orlando *Sentinel*, Friday, 12 October 2012, p. A4

Situation Awareness

- Air-to-Air combat (WWII, Korea, Vietnam, Gulf)
- Air Force experiments, live & simulated
- Combined arms ground operations (armor & infantry)
- Urban operations: targeting, logistics, communications

'Air combat experience going at least back to the Second World War suggests that surprise in the form of the unseen attacker has been pivotal in three-quarters or more of the kills...Lieutenant Colonel Mark Hubbard [P-38 pilot, Eighth Air Force] stressed that "90% of all fighters shot down never saw the guy who hit them." Hubbard was by no means alone in observing that friction in the form of the unseen attacker from six o'clock played a dominant role in engagement outcomes. The American P-47 pilot Hubert Zemke (17.75 air-to-air kills...) stressed that "few pilots are shot down by enemies they see." Similarly, the German Me-109 pilot Erich Hartmann, whose 352 kills during World War II made him the top scorer of all time, later stated that he was "sure that eighty percent of kills never knew he was there before he opened fire."

ACEVAL (Air Combat Evaluation) and AIMVAL (Air Intercept Missile Evaluation), late 1970s major air-to-air heavily instrumented tests, Nevada. Blue: F-15s and F-14 vs Red: F-5Es (resembled MiG-21s); 40 nautical mile radius combat area; weapons for Blue: guns, short-range infrared missiles, and medium-range, radar-guided AIM-7F Sparrow. Red: guns and IR missiles.

AIMVAL: operational utility of 5 IR concepts.

ACEVAL: factors affecting engagement outcomes when multiple aircraft are involved, with force size, force ratio, and initial ground controlled intercept condition (Red advantage, neutral, or Blue advantage variables).

360 valid engagements involving 1,488 sorties needed by the design.

Example: '...perhaps the most famous single engagement of both tests was the ACEVAL "Towering Inferno" 4-v-4 in which all eight participants were shot down after a minute and 52 seconds, was not a valid trial.'

Watts' Final View of Sources of Friction

- Human physical & cognitive limits, magnified by stress, pressures & responsibilities
- Information uncertainties: environmental, organizational & human
- Nonlinearity of combat: long-term unpredictability, magnification of unknowable small differences & unforeseen events

The hypothesis leads to the following list of general friction's sources as a late-20th-century alternative to the eight Clausewitzian sources:

1. Constraints imposed by human physical and cognitive limits, whose magnitude or impact are inevitably magnified by the intense stresses, pressures, and responsibilities of actual combat.
2. Informational uncertainties and unforeseeable differences stemming, ultimately, from the spatial-temporal dispersion of information in the external environment, in military organizations, and in the mental constructs of individual participants.
3. The structural nonlinearity of combat processes which can give rise to the long-term unpredictability of results and outcomes by magnifying the effects of unknowable small differences and unforeseen events (or, conversely, producing negligible results from large inputs).

Conclusion: Some Possibilities for Analysis

- Improved robustness
- Agent-based models
- Improved, intensive Red-teaming
- Acknowledge that war is a human endeavor, not a machine undertaking; reduce our fascination with technology in war
- Analysis of military failures

Improved robustness by considering wider ranges of situations ('mission-system' approach at RAND; example: *Measuring Interdiction Capabilities in the Presence of Anti-Access Strategies*, Davis, McEver and Wilson, 2002).

Agent-based modeling, providing human characteristics (particularly weaknesses) to agents and making large numbers of runs (Marine Corps work at Quantico, the late Al Brandstein). AF simulation SEAS.

Improved 'Red teaming' with emphasis on identifying possible but unexpected behaviors, both friendly and enemy, including opportunities for failure!

Military Misfortunes book (next slide)

Military Misfortunes

- 1990 book: Cohen & Gooch
- Analyzing failure on the battlefield
 - Failure to learn
 - Failure to anticipate
 - Failure to adapt
 - Aggregate failure
 - Catastrophic failure
- Analytic Matrix
 - Command levels (top to bottom)
 - Tasks

Colleague introduced me to early book by Eliot A. Cohen & John Gooch (discarded from US Institute of Peace library)

Friction not mentioned; not even in index; Clausewitzian *Kritik* (critical analysis)

My view: the cases are all about friction.

Analytic Matrix is a fine way to identify opportunities for Clausewitzian friction to threaten operations.

Cases

Failure to learn: American antisubmarine warfare in 1942 (from the UK)

Resource allocation; Coordination & communication; Control & command; Doctrine & techniques

Failure to anticipate: Israel defense forces on the Suez front & the Golan Heights, 1973

Intelligence collection; Net assessment; Appropriate alert

Failure to adapt: The British at Gallipoli, August 1915

Supply of means; Identification of goals; Control & coordination

Aggregate failure: The defeat of the American Eighth Army in Korea, November-December 1950

Resources; Communication & monitoring; Doctrine; Understanding the enemy; Data on the enemy

Catastrophic failure: The French army & air force, May-June 1940

Image of future war; Conception of possible enemy action; Ability to react

Sources

- B.D. Watts, *Clausewitzian Friction and Future War*, McNair Paper 52, 1996
- C.v.Clausewitz, *On War*, ed. M. Howard & P. Paret, Princeton University Press, 1976
- M. Howard, *Clausewitz*, Oxford University Press, 1983
- R.A. Leonard, ed, *A Short Guide to Clausewitz On War*, Capricorn Books, 1968
- E. A. Cohen & J. Gooch, *Military Misfortunes. The Anatomy of Failure in War*, The Free Press, 1990

Finale: Some Homilies

- I think the essential prerequisite of sound military advice is that the giver must convince himself that if he were responsible for action, he would himself act so.
- The first thing is to realize in war we have to do not so much with numbers, arms and maneuvers, as with human nature.

The first comment is from P. M. S. Blackett, one of the founding fathers. C. P. Snow, I believe, repeated the comment in *Science and Government*, The Godkin Lectures at Harvard, 1960.

The second is by G. F. R. Henderson, an important British military historian and analyst of the late 19th Century; from *The Science of War*, published in 1905, posthumously, but repeated on many occasions.

End

- Questions?
- Comments?
- Workshop to follow

Workshop Construct

- Task: Plan airborne operation against boot of Italy
- Context
 - Launch aircraft from N. Africa
 - Over fly friendly naval force
 - Responsibility: avoid fratricide
- Apply Cohen & Gooch framework
 - Set command levels
 - Set critical tasks
- Determine possible failures: critical task-by-command level