

FRIENDLY FIRE DATA AND ANALYSIS

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Introduction

The topic of friendly fire has only recently become a subject for serious research and analysis. Until a few years ago, friendly fire was a matter believed to be trivial, in terms of impact on combat operations or casualties, or a matter that was better left undiscussed for morale and operational reasons. The failure to acknowledge the importance of the subject resulted in little analysis and study and hence a dearth of sound information and a lack of understanding of the phenomenon. Important writers and thinkers on military matters neglected the subject. For example, *The Encyclopedia of Military History*, by R. Ernest and Trevor N. Dupuy, published in 1970 and covering the period from 3500 B.C. to that date in about 1400 pages, with a 90 plus page general index (separate from an index of battles and sieges), with entries for "artillery," "air power," "ships," "doctrine," "organizations," and "strategy," has no entries for "fratricide," "friendly fire" or even "accidents" (a word used by John Keegan and Richard Holmes in their writings). Others have touched on the matter, with the implication that it is an important one. The godhead of military operational analysis, F. W. Lanchester, wrote, in 1916: "...It [the aeroplane as an auxiliary to tactical operations] is likely to be almost continuously under fire, and, according to some of the experiences of the present war, it has almost as much to fear in this respect from its friends as its foes...."¹ [As an aside, one might ask how Lanchester came to make the comment he did. The paper from whence the quotation is taken was originally published in September 1914. Lanchester, in a foreword to the 1916 book, says: "The text and order of the original articles have been preserved in the present volume, and thus the matter appears under the dates of its original publication. Revision has, in the main, been confined to ordinary legitimate corrections...." If that comment is taken literally, what "experiences" could Lanchester have been referring to; the Great War began in late July (Great Britain declared war on Germany on 4 August) of 1914. Perhaps the clue is found in the phrase "in the main"!]

Holmes devotes a few pages of *Acts of War. The Behavior of Men in Battle* (Macmillan, NY, 1985) to the topic of accidents, including friendly fire. Keegan does similarly, saying: "Accidental wounding is one of the major hazards of battle, and the desire to avoid it is one of the principal reasons underlying the professional soldiers' much derided obsession with drill. For among close-packed groups of men equipped with firearms, one's neighbor's weapon offers one a much more immediate threat to life than any wielded by an enemy...[But] there are numerous authentic accounts

¹ F. W. Lanchester, *Aircraft in Warfare. The Dawn of the Fourth Arm*, Constable and Company, London, 1916

of losses by 'friendly fire' - or even 'friendly' swordcuts - at Waterloo."²

A very significant study of the matter is that of Shrader, at the US Army Command and General Staff College, in 1982; Shrader did no more than suggest that the rate of friendly fire casualties was about two percent of all friendly casualties.³ That number has stayed in the minds of many since the early 1980s. The Gulf War, with its approximate 17 percent of US casualties from friendly fire (and a somewhat similar number for the UK units of the coalition) raised the specter that friendly fire casualties may have taken a substantial jump in modern war. On further reflection, it was noted that the common method of presenting friendly fire casualties (the ratio of casualties caused by friendly fire to the total number of casualties taken--including those inflicted by the enemy) is partially dependent on how effective the enemy is in causing casualties. Thus, a war like the Gulf War, where the enemy does a poor job (a highly desirable occurrence!), draws much more attention to the casualties caused by friendly fire. Additional reflection led to the now wide spread conclusion that friendly fire is not a minor event on the battlefield. Careful analysis has begun on previous wars, teasing from limited data the observation that the Gulf War was not an aberration and that significant effects from friendly fire have occurred in many, if not all, wars in history. Sa'adah must be credited with an early, if not the first, work to quantitatively identify the more realistic nature of friendly fire.⁴ Dr. Sa'adah drew on well-defined campaigns that serve to significantly contradict the oft-accepted two percent value. The summary of Sa'adah's short and exciting paper reads:

"The combat casualty surveys have two messages for the concept base for the control of fratricide: 1. The absolute numbers of US soldiers killed by US weapons in US hands are very high. Reassuring numbers such as 2 percent prevalence are nonsense; the surveys demonstrate a rate five, possibly ten times as great. 2. A risk of fratricide attaches to every weapon that is taken into battle."

Considerable research and analysis is now underway in a variety of institutions throughout the US defense establishment with the objective of developing an understanding of the phenomenon of friendly fire, in addition to developing ways to estimate the incidence and prevalence of friendly fire events.

A brief excursion, before moving on. An interesting observation stems from an examination of the US casualty distribution in the Gulf War. The US took 148 KIA (killed in action) casualties, of which 35 were from friendly fire and the remainder (113) were from enemy fire. There were 467

² John Keegan, *The Face of Battle. A Study of Agincourt, Waterloo and the Somme*, Penguin Books, 1978

³ Charles R. Shrader, *Amicide: The Problem of Friendly Fire in Modern War*, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1982

⁴ David M. Sa'adah, *Friendly Fire: Will We Get It Right This Time?*, a paper presented at the 31st Army Operations Research Symposium, Fort Lee, Virginia, 1992

WIA (wounded in action), of which 72 were from friendly fire and 395 from enemy fire. The ratio of WIA:KIA from friendly fire is about 2.1; the same ratio from enemy fire is about 3.5. Historically, the number of wounded in battle has ranged from 3 to 4 times the number of dead. Does the distinctly different ratio seen here from friendly fire suggest that US weapons are more lethal than enemy weapons? The data are so limited that we should not jump to conclusions, but it is a topic worthy of further exploration.

Terminology

A variety of words have been used to describe the events wherein military forces in active combat operations are unintentionally fired on by their own or allied forces. While fratricide is the most traditional, it has limitations; its base is male which makes its application to women soldiers, strictly speaking, incorrect. Further, the word has meanings other than that just defined. Perhaps its most common use is as the word for sympathetic explosions such as explosions initiated among stored ammunition when one round accidentally bursts, and inadvertent initiations among missiles from multiple independently-targeted re-entry vehicles. The phrase "friendly fire" is widely used and widely understood. It suffers from the fact that no fire is truly friendly. In addition, it is linguistically limited to gun fire (small arms and other direct fire weapons) and bursting-fragmenting weapons, not a serious limitation for present combat. Historically, when thrusting, stabbing and slashing weapons were the mode, much damage was done by friends on friends. The distinguished military historian, John Keegan, writes: "The Neanderthal pelvis with the spear wound is no evidence at all [for the question: did the prehistoric hunter fight men?], since it might have been inflicted by accident among a hunting party in the tumult of the kill; **everyone who handles weapons knows that the most dangerous ones are those held by immediate neighbors.**"⁵ (emphasis added) Shrader coined the word *amicicide* as an alternative for the very reasons just reviewed. [It is interesting to note that Shrader used both "amicicide" and "friendly fire" in the title of his 1982 paper.] Amicide has not completely caught on, but it does respond to some of the weaknesses of fratricide and friendly fire. This paper will use all three on occasion.

Amicide is All Around Us

Another observation is the ubiquitousness of amicide events. A scattering of citations makes the point. On 25 May 1993, *The Washington Post* (US) noted an incident under the lead: "Four Killed as Israeli Troops Open Fire on Each Other." The event occurred when one unit of parachute troops, often seen as crack soldiers, established an ambush designed to interdict Arab guerrillas in the Lebanon "Israeli security zone." A patrol unit, apparently from the same parent organization as that of the ambush team, passed through the ambush team on its way out. The patrol received a radio message to return; the ambush team did not hear the message. The patrol was taken under fire by the ambush team, assuming the approaching soldiers were guerrillas. The patrol returned fire and

⁵ John Keegan, *A History of Warfare*, 1993, Knopf, NY, p. 118

casualties were taken by both groups. Another lead from the same newspaper, 22 July 1993, reads: "Three Texas Guardsmen Killed by Fellow Soldiers." During live fire training the three soldiers, having dismounted from their armored fighting vehicle, were apparently mistaken for the targets other shooters were engaging. On 20 July 1994, a lead in the *Post* read: "Michigan Guard Troops Bombard House, Not Target." In this case, an artillery unit fired a training round that traveled about 10,000 feet more than it was targeted to do. A quotation from an Army spokesman is interesting: "...the right people doing the right job the way they've been doing it, probably for a number of years, but there was a slight screw-up." From the *Post* of 24 August 1994: "NY Officers, Commuter Wounded in Subway Gunfire" relates to a case of police officers from the transit authority and an off-duty NY city policeman opening fire on each other, as a result of mistaken identification.

The US Navy reported 35 friendly fire events during World War II, resulting in some sinkings and considerable damage as well as 126 KIA and 267 WIA. The events reported exclude maritime collisions between friendly vessels, unexplained explosions and mines. Some believe the reports represent only a fraction of the actual friendly fire events. Another World War II event that is often included in anecdotal writings of amicicide is that of the US and Canadian forces attack on Kiska Island in Aleutians, August 1943. What is remarkable about this event is that there were **no enemy** on the island at the time of the assault. The landing force elements took 24 KIA from friendly fire; 50 soldiers were WIA, some of whom were friendly fire casualties, some were injured by booby traps left behind by the Japanese forces, and some were from both. Steinweg, in a very recent paper, erroneously attributes all 28 KIA and 50 WIA to fratricide.⁶ Hawkins clarifies the matter by pointing out that four of the KIA were due to mines or booby traps and some of the WIA were also wounded by booby traps; the WIA cannot be separated.⁷

Jane's Defense Weekly reported on 17 August 1991 that three Serbs died and four were wounded when two fighter bombers of the Yugoslavian Air Force bombed their position, mistaking it for a Croat position that had earlier fired on an Army helicopter.

Importance of Amicicide Events

Rarely do amicicide events affect military operations above the level of company or battalion. Colleagues in the UK propose a four-level "importance" scale for assessing the impact of friendly fire events:

- Unimportant (no casualties and no significant effect on operations);
- Personal (to casualties and their friends and family);
- Battalion (friendly fire preventing or greatly hindering a battalion-level task); and

⁶ Kenneth K. Steinweg, "Dealing Realistically With Fratricide," *Parameters. U.S. Army War College Quarterly*, Vol. XXV, No. 1 (Spring 1995), pp. 4-29

⁷ Charles Hawkins, personal communication, 14 April 1995

Divisional (friendly fire preventing or greatly hindering a division or greater operation; also, incidents that produce hundreds of casualties would be designated divisional importance).⁸

In modern times, the case of Operation Cobra, an oft-cited example of a major fratricidal event, comes to mind as a Divisional event. On two successive days, troops set to lead Allied forces in the Normandy break-out, July 1944, were bombed by aircraft targeting the forward edge of the German defending units. About 600 casualties were taken; Operation Cobra was delayed in jumping off, and LTG Lesley J. McNair was one of the fatalities--the highest ranked US fatality of the war.

Another event that can be considered equivalent in importance to the Divisional class, with only a few casualties, was the loss of General "Stonewall" Jackson, Confederate States of America Corps commander. On 2 May 1863, Jackson was reviewing part of the battlefield at Chancellorsville, after a fine tactical move that had resulted in serious damage to the Union forces. As he returned to his lines, at about 2045 hours, he was fired on by his own elements (18th North Carolina). [Important to an understanding of friendly fire phenomena is the fact that, earlier that evening, following the successful attack by Jackson's Corps on Howard's XI Corps, the 8th Pennsylvania Cavalry, proceeding to support Howard in an almost casual way, surprised the advancing Confederate force. Catton's words are best here:

"A dozen yards from the turnpike the major [Pennock Huey, commanding the 8th Pennsylvania] suddenly realized that something had gone very wrong. He had barely time to order his men to draw their sabers and move at a gallop. Out into the turnpike came the cavalry, crashing squarely into the middle of Confederate General Robert Rode's division of infantry. There was a wide confused melee, with nobody knowing what was happening. Rebels as surprised as Federals, troopers slashing with sabers and taking bullets in return. A good many saddles were emptied, and Huey's survivors finally came drifting back to the Chancellorsville clearing, their mission unaccomplished.

"This was in some ways the least significant incident of a night filled with blunders and things gone wrong, and yet it may have been the most important thing done by Union troops that evening. For the Confederates, pausing to straighten out their lines before resuming the advance, **got the impression that Yankee cavalry was on the alert and could be expected to make sporadic assaults, and the advance guard grew extremely wary whenever unidentified horsemen loomed up in the uncertain moonlight.** And just a little bit later, when Stonewall Jackson and his staff came riding in from a scouting mission ahead of the lines, an overeager North Carolina infantry regiment fired a volley that knocked Jackson out of the saddle with a wound

⁸ R. C. Goodman, J. J. Harding and H. D. Richardson, *Friendly Fire and the Land Battle*, 1994 (in three volumes: Vol I (Note for the Record 4/94), Vol II (Note for the Record 5/94), and Vol III (Note for the Record 6/94)

that was to take his life."⁹ (emphasis added)]

Jackson was struck three times. In spite of concentrated care, the loss of blood and the onset of pneumonia was too much and Jackson died on 10 May. General Robert E. Lee, the senior CSA commander and Jackson's immediate superior, said, upon receiving the notification of the wounding: "Give him my affectionate regards; tell him to make haste and get well, and come back to me as soon as he can. He has lost his left arm, but I have lost my right." Privately, Lee ruminated: "Any victory would be dear at such a price. I know not how to replace him." Those were prophetic words. Two months after Chancellorsville, the Confederate and Federal armies met again in battle. During the first two days, in the vicinity of Gettysburg, four Federal army corps were beaten in succession, but by the end of the third Lee had been defeated. There seems to have been little change in the way his soldiers fought, displaying "...the same fiery courage and stubborn persistence which had carried them victorious through the Wilderness." But his "right arm" had not been replaced. Lee said, after the war: "If I had Jackson at Gettysburg I should have won the battle, and a complete victory there would have resulted in the establishment of Southern independence."¹⁰

Continuing with the Chancellorsville experience, Catton cites a related fratricide incident:

"On the right the advancing Federals bumped into a line of Slocum's soldiers who thought the Rebels were charging them, and there was a desperate fight between opposing groups of Union troops. In the midst of all of this the Yankee gunners by the cemetery sprang to their pieces and began to hammer the contestants indiscriminately with canister and shell, and Rebel artillery off to the west began firing in reply. In the road and under the trees there was perhaps the most complete infernal mix-up of the army's entire experience, Rebel yell and Federal cheer mixed in together, officers swearing and beating ineffectively with their swords, men screaming, 'Don't fire--we're friends!' and nobody able to straighten anything out. "Looking back on it afterward, General Alpheus Williams of the XII Corps remembered 'such an infernal and yet sublime combination of sound and flame and smoke, and dreadful yells of rage, of pain, of triumph, or of defiance.' Less emotionally, General Slocum reported: 'I have no information as to the damage suffered by our troops from our own fire, but fear that our losses must have been severe.' A Massachusetts infantryman who watched from a vantage point near the cemetery, wondered how anyone at all survived the assault and the cannonade, especially the latter. The Federal gunners were filling their pieces with all kinds of old iron, he said, including such things as trace chains."¹¹

⁹ Bruce Catton, *Glory Road*, Doubleday & Company, 1952, page 188

¹⁰ Historical references and quotations from G. F. R. Henderson, *Stonewall Jackson and the American Civil War*, 1898

¹¹ Catton, *op.cit.*, pages 191-192

The Viet Nam Data

Steinweg's recent paper is a valuable contribution to the literature on amicide. He has done the community good service by summarizing and highlighting many of the possible data sources that have hitherto not been well assessed. One data source mentioned is that of the WDMET project, for Wound Data and Munitions Effectiveness Team-Vietnam. The project was a massive undertaking carried out between 1967 and 1969 in Vietnam. The data collection teams tracked casualties in four U.S. divisions for about 24 months. Almost 8,000 casualties were assessed in considerable detail, including interviews with the casualties and witnesses to the casualty-producing event; data from medical aide personnel; data from the hospitals; autopsy reports for the KIA and DOW; and weather, terrain and situational data for the circumstances around the casualty-producing event. The causative weapon was carefully identified in a large number of cases. The data are available in a database management system table and can be examined and queried in a variety of ways. However, as Steinweg points out and this writer has learned to his dismay, the data cannot be taken completely at face value. It is necessary to examine each element for internal consistency. Oftentimes, the causative weapon cited cannot be completely confirmed or is questionable because of conflicting data elsewhere in the files. On the other hand, it is a very useful set of data to help define how and why--under what circumstances--amicide occurs.

Summary results from a series of examinations of the WDMET data follow. Approximately 265 incidents have been preliminarily identified as friendly fire events. The distribution of incidents by time of day and month of year are shown in Tables 1 and 2, respectively. The use of the phrase "preliminarily identified" is judicious. Careful examination of the circumstances surrounding particular incidents leads quickly to the observation that more than one amicide event is captured under a single WDMET incident number. The WDMET numbering system uses a five-digit identifier for (ostensibly) a single event, following by a dash and a two-digit number to identify the casualty resulting from the event. Thus, in the case of multiple casualties, one will find a series of the same five-digit identifier with different casualty identifiers (e.g., 01, 02,...09, etc). Examination of individual casualty cases sometimes yields different causative weapons within the same (ostensibly) event. Identification of different weapons such as 105 mm howitzer fragments vs. 155 mm howitzer fragments vs. 81 mm mortar fragments are not an important problem. Cases that include 105 mm howitzer fragments and M16 rifle rounds and M79 grenades as causative agents within the same event are important problems.

Table 1 shows that most (almost 70 percent) friendly fire events occurred during the daylight hours. One possible explanation is related to the modes of operation in Viet Nam. US forces did not conduct much in the way of night operations and fratricide is certainly related to the operational tempo.

Table 1. Amicide Events by Time of Day, Viet Nam (WDMET Data)

Time of Day	Number of Events
Daylight (0500-1800)	182
Darkness (1800-0500)	81
Total	263

Table 2 shows that there was a quite distinct lessening of friendly fire events during the months of April, May and June. A quick check of weather conditions did not yield anything unusual about those months. A cross-walk with unit histories is needed to determine if there was a major change in operational tempo during those spring months.

Table 2. Amicide Events by Year and Month, Viet Nam (WDMET Data)

Month	1967	1968	1969	Total
January	--	19	13	32
February	--	9	17	26
March	--	11	27	38
April	--	9*	1	10
May	--	3	0	3
June	--	2	0	2
July	3	10	--	13
August	20	12	--	32
September	19	19	--	38
October	13	12	--	25
November	5	20**	--	25
December	10	9	--	19
Total	70	135	58	263

* One event probably an accident (MG malfunction/M72 LAW backblast)

** One event with a 1969 date is probably 1968.

The following tables (3 through 9) provide additional summary findings from simple tabulations and sorts of the WDMET data. What becomes immediately obvious is that even this fine data set cannot stand on its own. There is considerable textual material included with each casualty identification number; each file contains: the type of casualty; the date and time the casualty occurred; the weapon that caused the casualty; the military unit to which the soldier belonged; the weather and terrain conditions; the friendly and enemy situations; the incident summary; the casualty and observer(s) interviews; casualty diagnosis; and principal cause of death for the KIA, DOW and NBD (non-battle deaths). As can be expected, not all data elements are equally complete; in many of the tables below there are indications of missing or incomplete data elements. Reviewing the text material is very difficult using the data management system; printing the information from the files is more than a trivial exercise. More needs to be done before this data set can be used to help understand the phenomenon called friendly fire.

Table 3. Fratricide Casualties by Year, Viet Nam (WDMET Data)

Year	WIA	KIA	Total
1967*	88	15	103
1968	267	19	286
1969*	95	6	101
Total	450	40	490

* Only 6 months of observations

Table 4. Fratricide Casualties and Events by Division, Viet Nam (WDMET Data)

Division	WIA	KIA	Total Casualties	Events
1 ID	81	14	95	63
1 AC	120	6	126	72
4 ID	41	1	42	32
25 ID	101	8	109	70
101 AB	39	0	39	12
div not identified	10	6	16	17
no unit specified	47	2	49	40
unknown	11	3	14	9
Total	450	40	490	315

Table 5. Small Arms Fratricide Casualties and Events, Viet Nam (WDMET Data)

Weapon	WIA	KIA	Total Casualties	Events
Rifle	28	10	38	36
Machine Gun	28*	2**	30	13
Miscellaneous	2	0	2	1
Total	58	12	70	51

* At least 4 from accidents

** Possibly rifle

Table 6. Grenade Fratricide Casualties and Events, Viet Nam (WDMET Data)

Grenade Type	WIA	KIA	Total	Events
M-26	71	2	73	47
M-79	58	2	60	48
M-33	3	0	3	1
Unknown	9	0	9	11?
Total	141	4	145	107

Table 7. Artillery Fratricide Casualties and Events, Viet Nam (WDMET Data)

Weapon	WIA	KIA	Total	Events
81 mm	25	6	31	14
4.2 in	5	0	5	2
105 mm	56	5	61	38
155 mm	14	0	14	9
Unknown	34	0	34	18
Total	134	11	145	81

Table 8. Air-to-Ground Fratricide Casualties and Events, Viet Nam (WDMET Data)

Weapon	WIA	KIA	Total	Events
2.75 in. Rocket	28	1	29	9
Bomb	40	0	40	11
Napalm	14	0	14	3
Total	82	1	83	23

Table 9. Miscellaneous Weapons Fratricide Casualties and Events, Viet Nam (WDMET Data)

Weapon	WIA	KIA	Total	Events
Claymore	4	3	7	5
M-72 LAW	5*	0	5	5
Recoilless Rifle	5**	1	6	6
Shotgun	2	0	2	1
Unknown frag	5	0	5	6
Total	21	4	25	23

* At least two accidents

** Mostly accidents

Some General Observations

I include here thoughts, suggestions and findings of colleagues and friends who have discussed friendly fire with me over the past few months as well as material drawn from other papers.

Patrick Wood urges that the definition of amicicide should exclude weapons malfunctions (e.g., rounds exploding in chambers) or weapons accidents (e.g., back blast from a recoilless rifle). In support of the argument, he says:

"There is no real difference between technical failures in the presence of the enemy and those that occur further back; the cures are the same. I think an essential element of the phenomenon we are interested in is the intent of the firer to engage either a specific target or to fire at a specific point/area on the ground. The definition should make this clear. The distinction is important because the solutions to technical

malfunction and to true fratricide are different."¹²

I agree with his argument. It is necessary that analysts dealing with data representing friendly fire incidents take care to be explicit about incidents that are included as well as excluded. Wood also raises a caution about being too enamored of classifying events by the causal weapon, making the point that the distribution and use of weapons will be dictated by the nature of the conflict. Again, I agree; however, a classification of causal factors by classes of weapons (e.g., direct and indirect fire, grenades, air-to-ground direct and indirect [that is, "iron" bombs]) would be useful so long as the implications were categorized by the nature of the conflict, for example, as Wood points out, mounted vs. dismounted operations. Thus, one should not worry too much about grenade friendly fire events during highly mechanized operations but should be concerned about them during dismounted operations in built-up areas. Wood's final observations are the most significant in that he goes to the heart of the matter concerning the factors that cause or result in amicide events. To summarize, using Wood's own words:

"...it seems to me that the aspects we ought to concentrate on historically are: the rules of engagement in force at the time, the way in which the battle was planned (was the possibility considered that hazardous situations might occur?), how it developed (were there any breakdowns in communications, how confused did it become, were any of the units involved in the wrong place?) and, if possible, the state of training and morale of the troops. From what I have read, it appears that the basic military skills of good discipline, good planning and good staff procedures could obviate most of the incidents that occur. This reinforces the value of concentrating analysis on the tactical and procedural aspects of past incidents, where the necessary information exists...."

Hawkins analyzed data for his own battalion in Viet Nam representing three months in 1970.¹³ His results generally support the notion that friendly fire casualties historically were considerably greater than the two percent often cited. What is of perhaps greater interest are some "judgements" he comes to as a result of this and other analyses. Paraphrased, his observations are: (1) friendly fire casualties seem to increase with the number of combat actions (perhaps because of the complexities of managing combat elements or the increased complex mix of weapons in an increased number of actions); (2) friendly fire casualties seem to increase as terrain becomes more harsh (perhaps related to increased difficulties with command and control in difficult terrain); and (3) friendly fire casualties seem to increase as weather and visibility improve (perhaps because better conditions led to more aggressive operations or greater use of airborne weapons). The last observation is the most argumentative of the three; the sparseness of Hawkins' data must be recognized, as well. Hawkins

¹² J. P. Wood, Defence Research Agency, Fort Halstead, Personal communication to the author, 12 January 1994

¹³ Charles F. Hawkins, *Friendly Fire Casualties: A Vietnam War Perspective*, Data Memory Systems, Inc., Fairfax, VA, August 1991

concludes his note with:

"Each judgement relates increases in friendly fire casualties in some way to increases in combat operational complexity and lethality: through a greater number of combat actions; by having more combat systems (armed aircraft, multiple fire support bases) available; or by increased command and control interactions on the battlefield. If this is correct, what does the curve, or trend-line, of friendly fire casualties as a percent of battlefield casualties look like? Is it leveling, or increasing?"

The US Army, through its Center for Army Lessons Learned, has produced a useful pamphlet to help put the fratricide matter in operational context for commanders.¹⁴ It contains vignettes to help educate; most have been drawn from recent combat experiences: OPERATIONS DESERT STORM (Gulf War), URGENT FURY (Grenada), and JUST CAUSE (Panama). The pamphlet contains considerable information, data and guidance, including rather daunting lists of fratricide-contributing factors and fratricide reduction measures, to help contain fratricide events. Some observations are particularly worthy of note here. For example, "In future conflicts, the best predictor of fratricide risk may be a function of the projected number of engagements and not a function of our projected casualties." And, "To be effective, procedures for achieving positive control must become a routine part of the planning, coordination, and rehearsal process for every tactical operation or mission." Reflect on Wood's comments, earlier.

Steinweg, cited much earlier as having made a fine contribution to the literature, in addition to identifying additional sources and summarizing data, raises some new issues. First, he derives a set of implications from the newly analyzed data and findings; some highlighted implications are:

Fratricide prevention must have high priority because our fratricide rates will become a serious political and ethical issue in future conflicts.

Reducing fratricide rates will provide a significant battlefield advantage for the American military.

Measures presently in use are not effective enough to reduce fratricide incidents.
[Steinweg includes the earlier cited Center for Army Lessons Learned Newsletter when discussing present fratricide-reduction measures.]

The modern battlefield is predisposed to increased fratricide rates.

Similar or identical weapon systems in the hands of friend and foe will push us inexorably toward ground IFF technology.

Joint doctrine will require us to revisit the issue. [I add that combined operations add complexity and require combined doctrinal and training efforts.]

A future battlefield that includes a nuclear, biological, or chemical environment will increase fratricide rates.

We need consistency in our terms and methods of calculating fratricide.

¹⁴ Center for Army Lessons Learned, *Fratricide: Reducing Self-Inflicted Losses*, US Army Combined Arms Command, Fort Leavenworth, KS, Newsletter No. 92-4, April 1992

We must take the known limitations of human performance into account when running computer simulations and testing equipment for the battlefield.

Steinweg has also surfaced an important factor by emphasizing the human behavioral component (note the last implication). He raises the topics of combat stressors and sleep deprivation (particularly as a product of continuous operations) with the resultant deterioration of performance as significant matters to be incorporated into analysis of the causal factors of fratricide and the development of measures to reduce the occurrence of fratricide.

An interesting consideration was raised by Bauman, Director of the US Army Doctrine and Training Command Analysis Center.¹⁵ It stems from observations around recent large scale command post exercises and experiments. Bauman suggests that the high-low mix of information technology, particularly evident during transition periods (which might describe the next few decades for the US Army), may create difficulties in interactions among commanders of different levels and may foster conditions for fratricide. During a major exercise, subordinate elements had battlefield situation information that was more current than that at higher echelons. When the subordinate units reported locations to higher headquarters, there was disbelief in the locations. It apparently took **several days** to convince the commander of the accuracy of the subordinate's assessment. Something to think about.

Final Observations and Plans

It is not surprising that a full understanding of amicide is not yet attained. It is a complex matter for which only sound analysis, appreciation of operational data, and good understanding of human behavior under stress can clarify. Valuable progress has been made, partially as a result of the impetus of the Gulf War events and the highlighting of those events by the UK and US military institutions and the press. A synthesis of the extent and quality of the knowledge base is needed, principally to identify the directions additional analysis should take.

A seriously neglected arena in the intensive efforts at situational awareness and combat identification now underway is that of **dismounted operations**. Much more needs to be done with combat data. The WDMET Viet Nam data need to be augmented by unit historical data (akin to the war diaries of UK units) in order to identify precursor events and conditions (for example, extent of exhaustion, degree of awareness, amount of tension, levels of experience). There is value in accessing the Korean War data, not yet undertaken. A combined UK-US task is needed to collate data on the UK division that served with the UN forces in Korea; the communications logs are archived with the US corps to which the division was attached. In addition, parallel work should be undertaken on the US elements in Korea, particularly during the first year, the war of movement.

¹⁵ Michael Bauman, HQ, TRAC, personal communication, February 1995