

# High Explosive: Shock Effect in Dismounted Combat

by Dr Jim Storr

*Jim Storr is an independent defence analyst. This article follows on from one in last June's edition on the importance of suppression on the battlefield; suppression alone, however, does not win battles, but shock effect does – and high explosive is key to achieving this. The author discusses how this might be provided in counter-insurgency operations. A third article, linked to these, will appear in the October 2010 edition.*

A previous article<sup>1</sup> discussed suppression on the battlefield and looked at some of the practicalities of achieving it. Suppression alone, however, does not win battles and engagements. High Explosive (HE) clearly has a major part to play on the modern battlefield, but what is it? This article considers what the role of HE is, why it is important, and how best to deliver it in contemporary operations.

Operational analysis studies highlight that achieving surprise, or inflicting shock on the enemy, are hugely effective. They are more effective than any likely force ratio, or the use of almost any other tactical measure.<sup>2</sup> Put very simply, if the attacker can surprise the enemy, or apply sudden concentrated violence to him, and then exploit the resulting situation, the enemy will typically give up quite quickly. He will then either withdraw, if he can, or surrender. Shock and surprise are very strongly correlated with tactical success in land combat, to the extent that it is worth pursuing those two effects almost to the exclusion of anything else.<sup>3</sup>

Moreover, other research suggests that without a mechanism for achieving shock, combat is rarely decisive.<sup>4</sup> Without shock, fighting tends to be protracted and indecisive, which is what we seem to be observing in current conflicts. We repeatedly see Coalition forces engaged in lengthy firefights, which may kill and incapacitate insurgents, but rarely seem to definitively convince the enemy to give up and not come back. Furthermore, surprise and suppression may be highly disconcerting, but of themselves they are rarely anything more than that. Shock is critically important.

For the purposes of this article we shall use the following definitions. 'Suppression' is the effect of small arms and other weapons which prevents the enemy firing its weapons or moving in the open *whilst the fire is falling*. 'Neutralisation' is the effect of weapons that prevents the enemy firing its weapons or moving in the open *for some time after the fire stops*. It is generally associated with indirect or area fire. 'Destruction', in dismounted combat, means death or incapacitation. For a piece of equipment, such as an armoured

fighting vehicle, it means 'rendered unuseable' for the purposes of the present engagement. 'Surprise' is taken to have its general meaning. 'Shock effect' is a state where all or part of the enemy is rendered numb, lifeless, inactive or acting irrationally. 'Shock action' is the sudden, concentrated application of violence. It has been associated with rapid approach, such as a cavalry or bayonet charge, a tank attack, or a dive bomb attack. More importantly, it also includes the effect of concentrated HE fire.

Suppression, neutralisation and destruction are typically individual effects; they affect individual targets. Surprise and shock can affect individuals or groups, and in the discussion above shock effect is a collective phenomenon. Collective surprise is closely related to command, in terms of both commanders' psychology and the behaviour of the staff of command posts.<sup>5</sup>

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## Shock Effect and Tactical Success

Armed with these definitions, we can begin to understand what happens on a battlefield. Battlefield movement and weapons effects lead to either individuals being surprised, suppressed, neutralised, killed or incapacitated, which will tend to make those individuals refrain from taking part in the battle, panic, run away, or some combination. We can view those symptoms as surprise and shock effect. We know that shock and surprise are strongly *correlated* with tactical success, and we can suggest that they *lead* to it. Tactical success comes when all or most of the enemy believe they are beaten. It is therefore a collective phenomenon. This process is represented in Figure 1.

However, even in a small engagement, combat is a many-on-many interaction. In addition, surprise, suppression, neutralisation and destruction of individuals or small groups of enemy can make it easier to move and to employ weapons. The left-hand end of the diagram is therefore highly interactive.

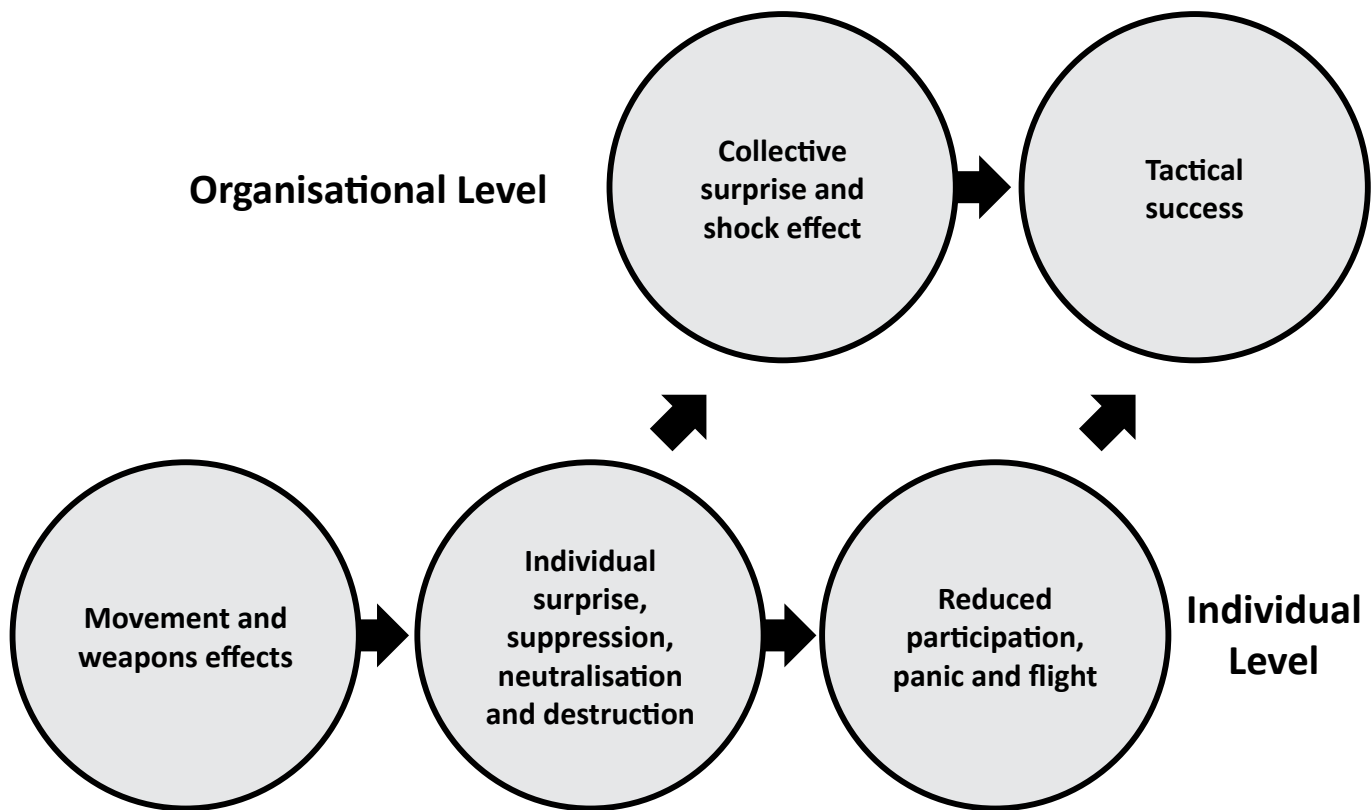


Figure 1: General Model of Land Tactical Combat

Figure 1 is illustrative, but greatly underemphasises the complexity of a real battle.

Without effective surprise or shock action, shock effect does not occur. The enemy can typically make a rational decision about *if* and *when* to withdraw; living to fight another day. This can be represented by Figure 2. In such cases combat is typically far less decisive.

A significant consequence of Figure 1 is that neutralisation and destruction can be strongly linked to shock effect. That reflects common sense understandings of the term. However, ‘neutralisation’ and ‘destruction’ describe individual effects, whilst shock and surprise are largely collective effects. Critically, shock action is the sudden, *concentrated* application of violence. Shock action is most unlikely to relate to the effects of single-shot weapons; no matter how impressive individually.<sup>6</sup> It requires *volleys* of HE, or weapons with high rates of fire, or several weapons acting in concert.

**Historical and Contemporary Examples**

Before looking at implications for contemporary operations we should briefly consider history. It was probably at the Battle of Hamel on 4 July 1918 that the British armies learned definitively how to link the neutralisation and destruction of effective artillery fire with a coordinated tank and infantry attack – the Australian Corps captured all its objectives in 93 minutes. However, by the beginning of the Second World War

the Germans had deployed effective anti-tank guns. Even a few surviving machine guns and anti-tank guns could completely break the momentum of a ‘Hamel-style’ attack.<sup>7</sup> The British Army quickly realised that all tanks had to be able to fire an HE shell of at least 75mm calibre.<sup>8</sup> By 1944-5 British units were conducting very effective, closely coordinated tank-infantry attacks supported by artillery fire.

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Today, Western armies have reasonably competent tactics for the attack in general war. Those armies are probably somewhat lacking in practice by the standards of 1944-5, but that is currently not a big problem. What is more of a problem is protracted, indecisive operations in irregular warfare.

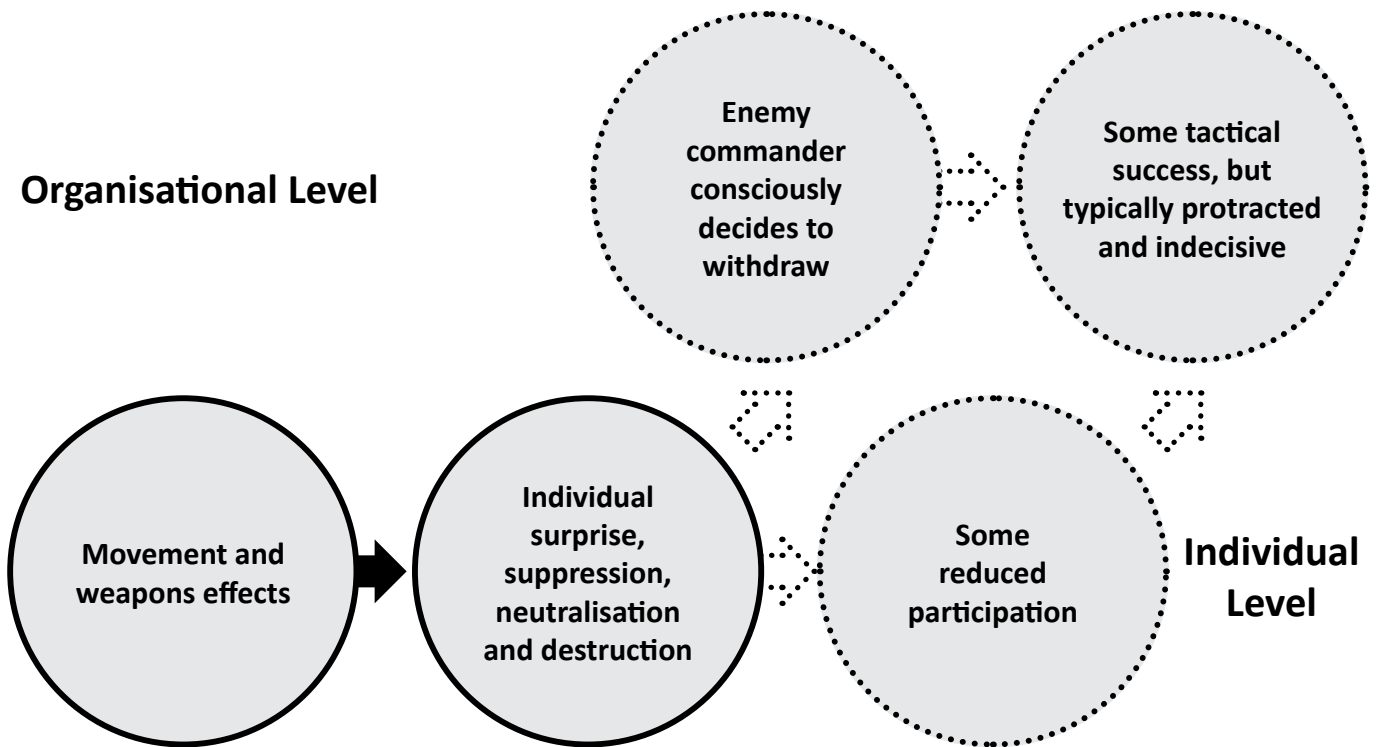


Figure 2: Land Combat Without Shock and Surprise

How should we convince an insurgent enemy force that it is suddenly and decisively beaten, and that the same is likely to happen if it attacks again?

The key is shock, yet we cannot employ the classic tools of shock action: artillery barrages and tanks. Artillery barrages would be unacceptable in a limited conflict, and we cannot in practice get tanks to where they would be needed. Two armies have successfully overcome similar problems. Their experience is useful.

Immediately after the First World War, the German Army was banned from procuring tanks. They realised they needed a weapon system that could deliver sudden, concentrated violence with considerable accuracy in direct support of the infantry.<sup>9</sup> They developed a 75mm light infantry gun and issued it at a scale of two per battalion. It was so successful that it stayed in service throughout the Second World War. It was eventually issued at a scale of two *per company* to armoured infantry units. Its German acronym was the LeIG 18<sup>10</sup>. A short video clip can be seen at:

[http://www.youtube.com/watch?v=QmzN67YC0oo&feature=player\\_embedded#](http://www.youtube.com/watch?v=QmzN67YC0oo&feature=player_embedded#)<sup>11</sup>

The Romanian Army has long had an operational requirement to fight in mountains. It faced a similar problem: how to deliver sudden, concentrated direct fire to targets in inaccessible places. Towards the end of the Cold War they developed a 76mm mountain gun called the Model 1984 (M1984). See Table 1.

Both weapons were explicitly designed for direct fire against point targets. The LeIG 18 was tiny, equipped with a shield, and could reliably put shells through a window up to a kilometre away. It had a shotgun-type breech and hence a rapid rate of fire. It weighed 440kg, but could be manhandled very easily. The M1984 can reliably hit a 2m<sup>2</sup> target at 460 metres, and a 3m<sup>2</sup> target at 550 metres. It has the astonishingly high rate of fire of 25 rounds per minute (rpm) for the first minute. Individual 75mm or 76mm shells are not greatly effective, but imagine the effect of, say, 10 rounds hitting a 2m<sup>2</sup> target in about 25 seconds. Each round contains well over a pound of HE.

Characteristic	75mm LeIG 18	76mm M1984
Muzzle Velocity	210 m/s	400m/s
Weight of Shell	5.5kg	5.5kg
HE Filling	0.67kg	0.67kg
All-up Weight	440kg	730kg
Crew	4	7
Mobility	Jeep-type vehicle	Jeep-type vehicle or pack horse (7 loads)

Table 1: 75mm LeIG 18 and M1984 Mountain Gun



The Russian 82mm Automatic Mortar 'Vasilek' [Jim Storr]

gun off its wheels. It is therefore less easy to manhandle than the other two weapons. It does demonstrate, however, that there is a number of weapons of about 75–85mm calibre that can fire HE projectiles at point targets at ranges of up to perhaps 1000m at high rates of fire.

**HE in Counter-insurgency Operations**

Imagine, for a moment, a Coalition infantry company advancing towards a suspected enemy position in Afghanistan. The leading elements come under fire, and return fire. There is then a long, protracted and indecisive struggle to locate, suppress and neutralise the enemy. The infantry slowly works forward to clear the position. Indirect fire support is called for. That starts a protracted process of clearing targets for own troop safety and collateral damage. After a while the enemy realises that the Coalition forces are determined, and melts away to fight another day.

The Russian 2B9 Vasilek 82mm automatic mortar also has a direct fire capability. It is described as having reasonable accuracy out to 500m or perhaps 800m, but it is not clear what 'reasonable' means in this context. At 3.23kg, its bombs weigh appreciably less than the shells of the LeIG 18 or M1984. However, being automatic, it has a sustained rate of fire of perhaps 100 to 120 rpm. It has a travelling weight of 800kg. This reduces to 632kg in action, but that requires raising the

As an alternative, imagine the same company supported by a section of two 75mm field guns, moved by light vehicles such as All Terrain Mobility Platforms. Immediately the leading infantry platoon comes under fire, the section commander moves forward, locates the target, and brings his first gun into action at a range of a few hundred yards. On identifying the



The German 7.5cm LeIG 18 [Jim Storr]

target, the detachment commander engages immediately. The second round hits the target and is followed by five more in the next 15 seconds. The target is destroyed. A second enemy position opens up, but the section commander has deployed his second gun in an overwatch position. The second enemy position is located and destroyed within a minute. The enemy commander is deeply shocked. Two of his key positions have been destroyed in two minutes. He orders a hurried withdrawal. The flight is quickly detected by infantry and attack helicopters, and turns into a rout. On the third, or perhaps the fourth, time that that happens the regional insurgent commander decides that discretion is the better part of valour and starts to negotiate.

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This is clearly an imaginary scenario, but it serves to indicate that Coalition forces are missing something. Attacks by a modern, well-equipped Western force against a few lightly-armed insurgents should not typically be lengthy and indecisive. We are missing the wherewithal to apply sudden, concentrated violence. Long-range precision attack systems don't provide that. Single-shot shoulder-fired weapons don't provide that. They may provide individual neutralisation and destruction, but that is not shock action. Such weapons are not likely to achieve shock effect. Without some way of achieving shock, combat tends to be protracted and indecisive.

**Achieving Shock Effect in Irregular Warfare**

Of itself, HE suppresses, neutralises and destroys. That is, it kills or incapacitates. If properly employed, concentrated HE is the main instrument for achieving shock effect on the battlefield. Shock effect is critical in achieving sudden, decisive tactical success. Western armed forces lack the means to achieve shock effect in remote places in irregular war. A system like a 75mm infantry gun – similar to the LeIG 18 or M1984 – could provide the means to do so.

This article does not pretend that lightweight 75mm field guns are the answer to every battlefield problem, but it does suggest a clear, simple way of linking tactical movement and weapons effect to tactical success. The path lies through surprise, suppression, neutralisation and destruction; and then via shock and surprise. It enables us to clarify what kinds of weapons we need, and why. It also suggests that Coalition forces currently

lack a way of delivering shock action on the battlefield in irregular warfare.

We have not yet considered the whole problem. We have discussed suppression, neutralisation and destruction; but we have not yet considered tactics. A forthcoming article will address this overall process of using troop movement and weapons effect to encourage, persuade or coerce the enemy that he is beaten; and thereby achieve tactical success in dismounted combat. ■

*The author is grateful to Dermot Rooney and William Owen for their comments on a draft of this article.*

**NOTES**

- <sup>1</sup> Jim Storr, 'The Real Role of Small Arms in Combat', *RUSI Defence Systems*, Volume 12 No 1, June 2009, pages 44–6
- <sup>2</sup> 'The Effects of Shock and Surprise on the Land Battle', *Defence Operational Analysis Establishment Memorandum R9301*, August 1993
- <sup>3</sup> Army Doctrine Publication *Land Operations*, Army Code 71819, May 2005, Paragraphs 0210-0227. Shock and surprise were the core elements in the author's teaching of the contents of *Land Operations* to brigade and battlegroup commanders from 2003 to 2006
- <sup>4</sup> Archer Jones, *The Art of War in the Western World*, Harrap, London, 1987, page 40 and *passim*
- <sup>5</sup> Jim Storr, *The Human Face of War*, Continuum, London, May 2009, page 86
- <sup>6</sup> A law of diminishing returns applies here. In simple terms, blast effects obey an inverse cube law, which means that eight times as much HE is required to double the blast radius of a given type of device. The perceived size of the explosion may be very much bigger, but the effect not much larger. To deliver eight times as much HE, the calibre of the weapon must be roughly twice as great, which has major implications for the size of the weapon. Consider, for example, the difference in size and weight between a 51mm mortar and an 81mm mortar (only 1.6 times larger in calibre)
- <sup>7</sup> *Military Training and the British Army, 1940-44*, Timothy Harrison Place, London, Frank Cass 2000, page 68ff
- <sup>8</sup> Peter Chamberlain and Chris Ellis, *British and American Tanks of World War Two*, Cassell and Co, London, 2000, pages 12 and 114
- <sup>9</sup> Ian Hogg, *German Artillery of World War Two*, Greenhill Books, London, page 18
- <sup>10</sup> 7.5cm Leichtes InfanterieGeschutz 18. Unusually, the '18' did not signify the year it entered service
- <sup>11</sup> Note, particularly, the last few seconds of the clip, in which the IG 18 is being used for direct fire