# Why Howitzers?

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The question "why howitzers" was asked by Mr T R Calderbank in the Dispatches section of First Empire No 13. In fact Mr Calderbank's letter asked several questions regarding the use and effectiveness of howitzers. The answer to the main question, "why howitzers" could perhaps be summed up in one simple statement. The cannon is a kinetic energy weapon which relies on the velocity of its projectile for its destructive effectiveness. As the range increases, and the remaining velocity of the projectile decreases, then the destructive effect of the projectile diminishes. This is not true of the howitzer when firing a common or shrapnel shell, the destructive effect of these projectiles is not reduced by range. Therefore the howitzer is more effective, in terms of ammunition expenditure, at longer ranges.

To fully answer the question it is necessary to look at the different effects of projectiles and their use on the battlefield. For this I have drawn extensively on two books by Major General B. P. Hughes, my apologies to those of you who have these works, as you will find the following all too familiar. Details of these, and the other primary sources used in the article, are given at the end.

## THE ORDNANCE

There are three separate pieces of ordnance used by the artillery; Guns, Howitzers and Mortars.

### The Gun

The gun is designed to give the highest possible muzzle velocity to its projectiles, not only to give them the greatest possible range but also to increase their destructive power. This demanded a long piece, so that the gases produced by the exploding propellant charge could act upon the projectile for as long a period as possible. The greater the length of the barrel the greater the muzzle velocity. The other contributing factors in determining velocity were the weight of the projectile and the amount of charge used to propel it. In general terms the napoleonic gun had a barrel whose length was between fourteen and twenty four times it calibre. Cannon were categorised in accordance with the weight of shot that they fired. Table 1 shows details for various pieces in 1815.

### The Howitzer

Howitzers were required to throw as heavy a projectile as possible on a curved trajectory and were therefore of larger calibre than guns. The barrel could be much shorter since a high velocity was not essential. They were generally between four and six times their calibres in length. The smaller propel lent charge was housed in a small chamber at the rear end of the bore to make it operate more efficiently. During the Napoleonic period the howitzers in British and French service were classified by their calibres. The British having 4.4, 5.5, 8 and 10 inch pieces. The French had 6 and 8 inch pieces. Other European powers used a system under which their howitzers were defined by the weight of a stone shot that would have fitted the bore. There were 7, 10, and 25lb howitzers in Austrian, Danish, and Prussian

**Table 1. Dimension of Guns**

| | Calibre (lb) | Charge (lb) | Barrel length in calibers | Total Weight of piece |
|---|---|---|---|---|
| France | 12 | 4 | 18 | 1,800 lb |
| | 8 | 2½ | 18 | 1,200lb |
| | 4 | 1½ | 18 | 600lb |
| England | 12 Med | 4 | 16 | 1,800lb |
| | 12 Lt | 4 | 13 | 1,200lb |
| | 6 Med | 2 | 18 | 875lb |
| | 6 Lt | 1½ | 14 | 500lb |
| Prussia | 12 | 4 | 18 | 1,847lb |
| | 6 Hvy | 2¼ | 22 | 1,617lb |
| | 6 Lt | 2¼ | 18 | 935lb |
| Austria | 12 | 3 | 16 | 1,618lb |
| | 6 | 1½ | 16 | 824lb |
| | 3 | 7/8 | 16 | 480lb |
| Russia | 12 | 4 | 18 | 2,080lb |
| | 6 | 2 | 18 | 880lb |

service. A further complication in the classification of howitzers comes when you consider that the bombs weighed more than their stone equivalent. For example the bomb thrown by the 7lb howitzer weighed between 14lb and 15lb. Although a greater length of barrel would increase both range and accuracy it would complicate the loading process. In practice the barrel lengths of field pieces were about 2¼ feet long. This enabled the gunner to easily place the charge in the chamber. Howitzer carriages were heavier than those for guns of similar barrel weight as they needed to absorb more shock from the high angled fire. Table 2 shows the charge weight, and the total weight of various pieces.

Table 2. Howitzer Weights and Charges

| Country | Calibre | Total Weight | Charge (lb) |
|---|---|---|---|
| France | 6" | 650lb | 11/16 |
| | 8" | 1,120lb | 1¾ |
| England | 5½" | 450lb | 1 |
| | 8" | 1,428lb | 3½ |
| | 10" | 2,860lb | 6½ |
| Prussia | 7lb | 572lb | 2 |
| | 10lb | 1,370lb | 2¾ |
| Austria | 7lb | 563lb | 1¼ |
| | 10lb | 824lb | 2 |
| Russia | 10lb Unicorn | 960lb | 2 |
| | 20lb | 1680lb | 4 |

### The Mortar

Mortars exaggerated the characteristics of howitzers, being designed purely for high-angle fire. They varied in calibre between 8 and 12 inches. The carriages were almost as heavy as

the weapon itself, the French 12 inch mortar weighing 3,150lb, with a bed being 3,000lb, giving a total weight of 6,150lb. They were rarely used in the field and I will not cover them further.

## THE PROJECTILES

Having looked at the type of ordnance available to the napoleonic artilleryman we should now consider the ammunition used by the different types. The majority of ammunition consisted of spherical projectiles which were propelled by a charge of gunpowder enclosed in a flannel bag, usually loaded separately from the projectile. The charge was ignited by a `tube', made from either tin or goose quill, containing an inflammable composition. This was placed in a hole in the breech, called the vent, and ignited by the `portfire'.

### Round Shot

Round Shot was the primary projectile of the gun. From the scales of ammunition held it is clear that round shot was considered the most effective artillery projectile. For all field guns between 70% and 80% of ammunition was of this type. Round shot were solid cast iron spheres, the weight of which defined the size and classification of the guns which fired them. The diameter of the smallest commonly used was just under three inches, the largest was about four and a quarter inches. Even the smallest was devastating to whatever stood within its range, it could shatter a gun carriage or wagon, and slice through both men and horses. There are records of as many as forty men having been killed by a single shot at a range of 600 to 800 yards, although this is exceptional and should not be considered to be `the norm'. Round shot was devastating when used against the close formations of the period, where evasion of an approaching shot, which would have been visible, was almost impossible. It is important to appreciate the effect of the weight of the shot. There was little difference between the muzzle velocities of all the guns used in the field, however the heavier shot retained more velocity at longer ranges (at 1,000 yards - 18lb 840fps, 9lb 690fps, 6lb 450fps). The destructive power of shot depends on its kinetic energy, this varies directly with its weight but according to the square of the velocity. A 6lb shot was fifty percent more effective than a 3lb shot, and a 12lb shot was twice as effective as the 3lb shot. It was the out gunning of the British 6lb by the French 8lb and 12lb in the Peninsular which resulted in the reintroduction of the 9lb as the standard piece for field artillery. Wellington had half of his horse artillery troops rearmed with 9lb's for the Waterloo campaign on the recommendation of Sir Augustus Frazer, commander of the horse artillery. Any reduction in mobility (these pieces were drawn by 8 horse teams) was accepted for the greater fire effect. The reduced fire rate of the heavier gun does not seem to have been significant, although the heavier carriage of the 9lb would recoil further and require more effort to `run up'.

### Common Shell

The Common Shell was the primary projectile for howitzers in all armies other than the British. Howitzers did not fire round shot, which would have been ineffective when fired by this weapon due to the lower muzzle velocity and angle of fire. The Common Shell was a hollow sphere of iron which was filled with a charge of gunpowder. After filling a fuse was inserted, these were made of ash, birch, poplar, lime or beech-wood. Fuses had a series of marks showing the time of flight, that is the time before the main charge would be ignited. A hole would be punched in the side of the fuse to determine the time of flight. The joint between the fuse and the hole was tightly filled with oakum and painted with `glue' to prevent accidental ignition of the main charge within the shell at-the time of firing. The fuse was ignited by the flash of the howitzers propellant charge when the piece was fired. Fuses could not-be set accurately to effect an air burst' above a target, however this could be achieved by causing the shell to ricochet and burst after the `first graze'.

### Spherical Case or `Shrapnel' Shell

This projectile was used exclusively by the British artillery during the Napoleonic wars. It consisted of a hollow iron sphere filled with bullets and contained a bursting charge of gunpowder. The charge was ignited by a fuse similar to that used in the common shell. It blew open the shell at the predetermined point on the trajectory, ejecting the bullets, which continued to travel along the shell's path towards the target. It was most effective at longer ranges where the spread of the bullets cold compensate for any errors in the lay of the gun. Shrapnel was fired from both guns and howitzers. Field guns had between 13% and 19% ammunition of this type, and howitzers had as mush as 50%. The number of bullets in each shell varied considerably:

| | |
|---|---|
| 6lb gun | 85 to 27 |
| 9lb gun | 127 to 41 |
| 12lb gun | 170 to 63 |
| 5½" howitzer | 100 to 200 |

### Case or Canister Shot

This consisted of a tin case containing a number of loose bullets. The case burst when it left the muzzle and the bullets were released in a `cone' to the front of the gun. The diameter of the cone was recorded as being about 32 feet per 100 yards range. It is obvious that many of the balls would either hit the ground in front of, or rise over the intended target. Lethal range was limited to about 500 yards. The British restricted its use to about 350 yards. The French artillery, which usually carried more rounds and with heavier bullets, tended to use it at longer ranges, particularly in the attack. A British 6lb gun held only 28 rounds, and the 9lb gun only 16. Heavy and light versions of case shot were used. The British 6lb gun fired a `light' projectile containing 85 1½ ounce bullets, the `heavy' having 41 balls of 3¼ ounces. Von Pivka gives a different ratio, these are shown in Table 3. There are many references to the use of `Grape Shot' in the field. Grape, which consisted of 9 very large bullets wired together, was used very effectively against ships boats. There are no records of grape shot in the published scales of ammunition carried by field artillery.

### Flares, Incendiaries and Smoke Bombs

A number of specialist projectiles existed for illumination, fire, and for driving the enemy from mine galleries. These were used only by howitzers and mortars, and were not normally used in the field. The illuminating flares are of interest, if only to consider the complexity of the device. These were shells which had additional holes bored around the filling hole and which were filled with an incendiary mixture. The

**Table 3. Properties of Canister (Von Pivka**

| Country | Calibre (lb) | Bullets per cartridge | Weight of bullets (oz) | Charge (lb) |
|---|---|---|---|---|
| France | 12 Heavy | 41 | 6 | 4½ |
| | 12 Light | 112 | 2-3 | 4½ |
| | 8 Heavy | 41 | 4 | 2¾ |
| | 8 Light | 112 | 1-2 | 2¾ |
| | 4 | 63 | ¾-2 | 1¾ |
| England | 12 Medium | 42 | 6 | 3½ |
| | 12 Light | 34 | 3½ | 2½ |
| | 6 Medium | 42 | 6 | 3½ |
| | 6 Light | 34 | 3½ | 2½ |
| Prussia | 12 Heavy | 41 | 6 | 4 |
| | 12 Light | 170 | 1½ | 4 |
| | 6 | 41 | 3 | 2¼ |
| Austria | 12 Heavy | 12 | 16 | 3½ |
| | 12 Light | 28 | 6 | 3½ |
| | 6 Heavy | 28 | 3 | 2 |
| | 6 Light | 60 | 1½ | 2 |
| Russia | 12 | 36 | 6 | 3 |
| | 6 | 36 | 3 | 1½ |

composition is shown in Table 4. Types 1 and 3 were used for incendiary purposes, 2 and 4 for illumination. Both types contained various devices to discourage anyone approaching and attempting to extinguish them. Several section of musket barrel filled with powder and ball were set to fire at irregular intervals. These were 3" long and closed at one end. A grenade, built into the base of the compound, was set to explode when the incendiary charge was almost finished!

**Table 4. Illuminating Flare Mixtures (in lbs)**

| | No1 | No2 | No3 | No4 |
|---|---|---|---|---|
| Flour powder | | 1 | 1¼ | 6 |
| Saltpetre | 16.33 | 10 | 4½ | 12 |
| Sulpher | 10 | 4½ | 2½ | 6 |
| Antimony | 1¼ | 1 | 5/8 | |
| Sawdust | | | 3/8 | |
| Corn Powder | | | 9/16 | |
| Melted Mixture | 10 | | | |
| Saltpeter 'Griefen' | 2 | | | |

## EMPLOYMENT ON THE BATTLEFIELD

We must now look at how the ordnance was deployed and used on the battlefield.

### The Gun

Diagrams 1 and 2 show the theoretical performance of a 9lb gun firing round shot at various degrees of elevation. These are from the "Madras Records", a series of tests carried out in 1813. A 6lb gun ranged about 100 yards less. Diagram 1 shows the path followed by the projectile when fired at 0° elevation. After first contact with the ground, known as the `First graze', it ricocheted and continues to the `Second graze' The projectile is below man height for the whole of its path. It was possible to use this method to engage a target up to 800 or 900 yards distant, however the hitting power of the projectile would have been reduced by the previous `grazes', and of course there would be some measure of inaccuracy from each `bounce'. It was preferable to bring the projectile down on the target at the point of first graze. An increase of 1° elevation produces first and second grazes at longer range, see Diagram 2. The projectile is still lethal between these two points, and this effective zone extends for 300 yards. It was the length of this effective zone, which to some extent compensated for inaccuracies in the trajectory and laying, that made the gun the primary weapon of the napoleonic artillery. Any further elevation results in a reduction in the projectiles effectiveness. Shot which `dropped' onto a target lost a large amount of its kinetic energy, and the effective zone was greatly reduced. From this it can be seen that the preferred site for a gun is on ground which is level with that of its intended target. Guns sited on higher elevations would have a much lesser effect due to their `plunging fire'. It was also necessary for the gunner to have a clear line of sight to the target. This was not only necessary for the laying of the gun, but also for observing the fall of shot. It is for these reason that guns were normally placed either with or in front of the troops they were to support. The maximum effective range for guns could be stated as being about 1000 yards.

**Diagram 1. Trajectory of 9lb gun at 0° elevation.**

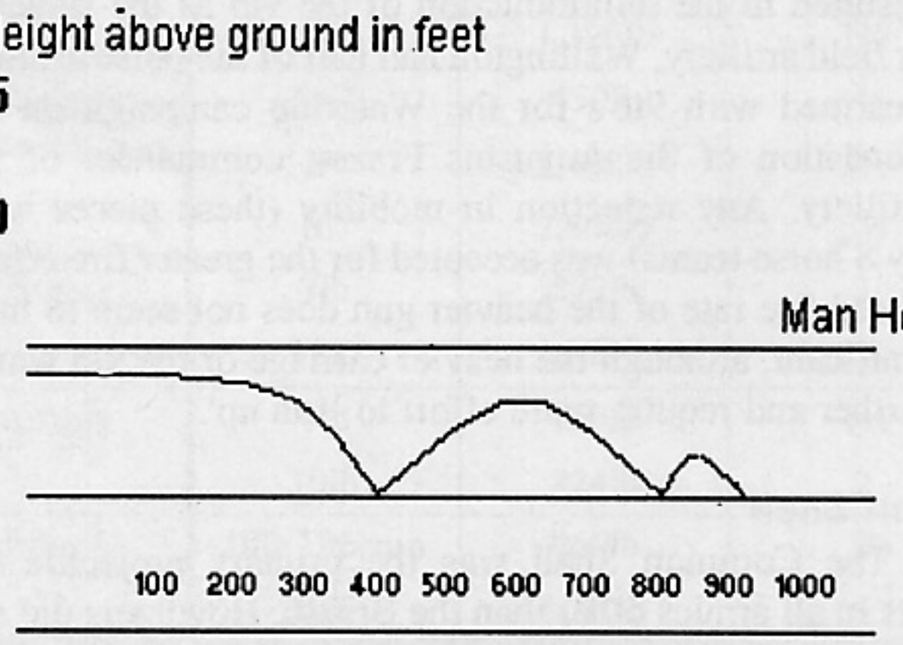
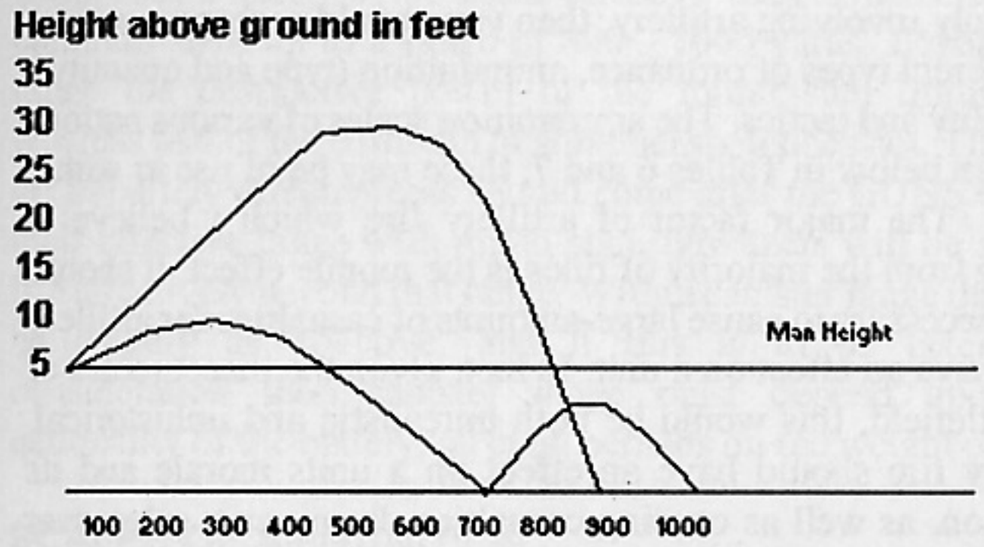


**Diagram 2. Trajectory of 9lb gun at 1° and 2° elevation.**




## The Howitzer

### Range

The Howitzer's high angle of fire, and its use of the common shell, did not require it to be placed in such an advantageous position as the gun. The howitzer was normally found either singly or in pairs within the napoleonic artillery unit. To my knowledge only there is only one instance of a unit being equipped solely with howitzers, and that is Bull's troop during the Waterloo campaign. From this it can be seen that the gun was considered a more effective weapon than the howitzer. Why then were they included? As we have seen, the howitzer's primary ammunition was the common shell. The effectiveness of this projectile was not reduced by range, as it did not rely on kinetic energy for its destructive power. It was therefore more efficient to use this for engaging at longer ranges, where the round shot would have `run out of steam'. Table 5 shows the ranges quoted for various howitzers.

**Table 5. Howitzer Ranges (Von Pivka)**

| Ordnance | Elevation | Weight | | Range in Yards | |
|---|---|---|---|---|---|
| | | Bomb | Charge | First Graze | Total |
| British Light 5½ inch | 5° | 15½lb | 1lb | - | 1,100 |
| | 11° | | | 770 | 1,400 |
| British Heavy 5½ inch | 5° | 15½lb | 2lb | 1,000 | 1,400 |
| | 5° | | 3lb | 1,325 | 1,900 |
| French 6 inch | 45° | 23lb | 1¾lb | | 1,200 |
| French 8 inch | 45° | 43lb | 1¾lb | | 1,600 |

### Effectiveness

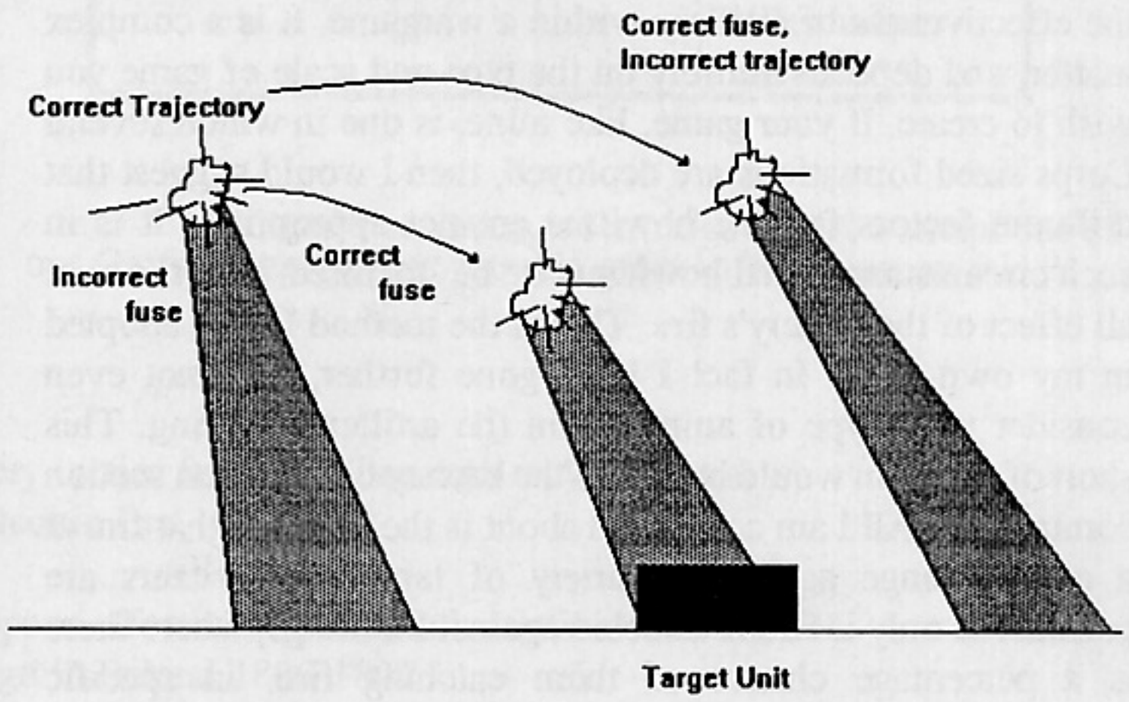
The common shell was also more effective to some extent when used against artillery. A gun and its crew produce a very small target area, with a large amount of 'air gaps' between the constituent pieces of the target. The use of round shot against such a target was largely ineffective, although if one did strike home then it would undoubtedly destroy either gun, limber or ammunition wagon. Trials carried out about 1800 recorded that 50% of rounds from a light gun were ineffective against a dummy gun at 520 yards, and 75% were ineffective at 850 yards. These figures would have reduced considerably under battlefield conditions. The common shell however did not require such a degree of accuracy. It would, if on target, explode amongst the battery, killing or wounding both men and horses. An exploding shell would also be more dangerous amongst the ammunition.

Although the howitzer was able to fire over the heads of intervening troops it was still necessary for the gunners to have sight of the target, especially when it were mobile. It would not be possible on the battlefield to `range in' on the target then continue to fire blind. The piece would recoil after every round and it would be impossible to run it up in exactly the same position and orientation as before. It would be like taking aim on the firing range, then closing both eyes after the first shot and hoping to get every round on target! There ace instances of such indirect fire, the most famous being Bull's support of Hougemount at Waterloo. It is worth noting that the Howitzers of both Sandham's and Kuhlmann's batteries (from the first Division and deployed on the ridge in front of the Foot Guards) also gave fire support at this time. Although the actual target, Reille's infantry, could not be seen, the target area could. Fire was directed onto the wooded area, not on to a specific target. It should also be remembered that these British howitzer would not be firing common shell, but shrapnel.

### The Use of Shrapnel

Shrapnel was used by the British and fired from both gun and howitzer. Various test records indicate a very low performance. Those carried out on Sutton Heath in 1812 recorded between 2% and 17% of bullets as having hit the target screens at ranges of between 700 and 1500 yards. A hit range of 10% is given by the Madras Records. When Wellington was shown the wounds suffered from Shrapnel by a French General at the battle of Bussaco he thought them `trifling', and was skeptical about the use of the shell, mainly due to the accuracy required. Despite this apparent ineffectiveness Shrapnel was used extensively in the field by the British for long range fire, the spread of bullets being more effective than plunging round shot. The heavier rounds fired by howitzers, which had more bullets, would have been more effective than those fired by guns. It also had an undoubted moral effect on the French, who never liked it. Accuracy was dependent on two major factors, the correct fuse setting and the right trajectory. Diagram 3 shows the effect of inaccuracy in either of these parameters.

**Diagram 3. Accuracy of Shrapnel.**



### The Use of Canister or Case Shot

This was used for engaging the target at close quarters. Although the theoretical range could be as much as 1000 yards for heavy case fired from a 12lb gun not all of the bullets would reach the target due to the spread, and the effective range was limited to about 500 yards. As previously discussed the British restricted its use to 350 yards. Taking the results of various tests Hughes gives the following effectiveness based on a British 6lb gun.

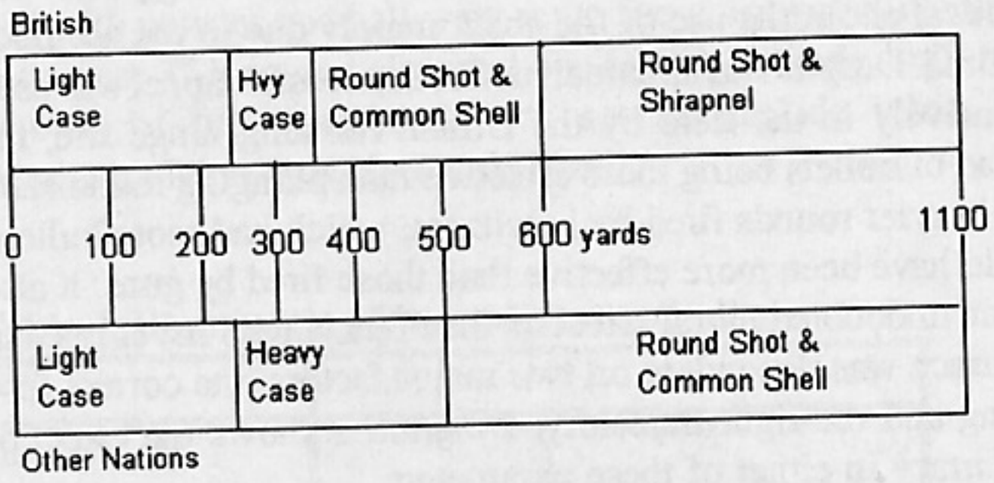
| Range | Hits per round fired |
|---|---|
| 200 yards | 55 bullets of light case |
| 400 yards | 36 bullets of light case |
| 600 yards | 6 bullets of heavy case |

Therefore a battery of six 6lb guns, firing about 500 bullets in a single salvo, could be expected to achieve approximately 300 hits on a target at 200 yards.

### Use of Different Projectiles at Various Ranges

From the above information we can see that guns and howitzers had their various roles to play. In executing their task a number of projectiles could be used, depending on range and type of target. Diagram 3 shows the use of projectiles at various ranges. In the example quoted by Mr Calderbank, that of Senarmont's artillery at Friedland, we can see that the howitzers included in this artillery group would not have been useless. They would have contributed, both by the use of heavy case for the direct engagement of the front of the enemy target, and I am sure by the use of common shell into the depth of the target. (Petre gives Senarmont 38 guns with a further 6 in reserve).

**Diagram 4. The use of projectiles at various ranges.**




## THE EFFECTS OF ARTILLERY IN WARGAMES

How then should we use this information to simulate the effectiveness of artillery within a wargame. It is a complex matter, and depends entirely on the type and scale of game you wish to create. If your game, like mine, is one in which several Corps sized formations are deployed, then I would suggest that different factors for one howitzer are not appropriate. It is in such circumstances that howitzer fire be `factored' in to the over all effect of the battery's fire. This is the method I have adopted in my own rules. In fact I have gone further, I do not even consider what type of ammunition the artillery is firing. This short of decision would be left to the battery or even gun section commander. All I am concerned about is the effect of that fire at a certain range against a variety of targets. Howitzers are considered only if fire is directed against buildings, where there is a percentage chance of them catching fire. In specific situations special rules are used, such as when our group `fought' Waterloo, rules were written for the use of Bull's Troop of howitzers.

If on the other hand you have the sort of game where individual pieces of artillery are significant, or perhaps play a game only involving artillery, then you should perhaps consider the different types of ordnance, ammunition (type and quantity), nationality and tactics. The ammunition scales of various nations are given below in Tables 6 and 7, these may be of use to some.

The major factor of artillery fire which I believe is missing from the majority of rules is the morale effect. It should not be necessary to cause large-amounts of casualties for artillery fire to have an effect on a unit. In fact, given the inaccuracies of the battlefield, this would be both unrealistic and unhistorical. Artillery fire should have an effect on a units morale and its formation, as well as causing casualties. In my own rules over 50% of artillery fire causes no casualties at ranges beyond 400 yards, the effects being limited to disorder and morale tests. This may seem ineffective for those who are used to removing a handful of figures after each round of fire, however the effects are dramatic, and cause the break up, and therefore the failure of an enemy's attack. Achieving a correct and balanced effect is quite tricky and requires many hours of play testing. It should not be impossible for well led and determined troops to advance through artillery fire, nor should it be possible for troops to ignore such fire. The number of casualties inflicted should not be the only factor which dictates the result of the fire.

Another factor which needs consideration is the rate of fire. My rules have a 15 minute game turn, and firing does not represent a single discharge or volley, but several during this period. My mechanisms restrict an artillery unit to 12 rounds of fire during the course of a game. This prevents the wargamer from firing at every target at every opportunity, a situation which did not arise on the battlefield. For longer games resupply is possible and this increases fire to 24 rounds, but after the 12th the battery is considered to be tired and receives a minus on all its fire. Some may find this restrictive, but consider that pieces did suffer from overheating after prolonged and rapid fire. (Bulls troops at Waterloo had to be withdrawn due to this fact, anyone got this in their rules?). An overheated piece was difficult to handle and if too hot it would not be possible to insert a new tube without it exploding prematurely. In addition the `ventsman' would be unable to serve the vent, even though he wore a leather thumbstall to protect his thumb. Physical exhaustion must also have played a part in decreasing a units efficiency. The handling and serving of a gun in action required great physical effort from the crew. Running up the piece, a ton in weight, after each recoil of 4' to 6' required a lot of effort from the crew, in addition to the normal activities of sponging and ramming. There was also constant movement backwards and forwards to bring up ammunition. Mercer reports his troop to be so exhausted that they were unable to run up their guns, which lay in a tangled mass with their trails interlocked, by the end of the action at Waterloo. Mercer's battery was not engaged for the whole of the battle, being brought into the line at 3:30pm to receive the cavalry charges. It was therefore in action for only 4 hours.

Mr Calderbank suggests we justify the rules mechanism we use. Although I have briefly described those which are use within my own rules I would not like to see a discussion of rules within the magazine, this often degenerates into meaningless arguments between different parties who prefer one set over another.

Finally Mr Calderbank draws a number of conclusions at the end of his letter, most of which I would dispute. Guns firing round shot will be more effective than howitzers firing common shell up to a range of 800 - 1000 yards. Beyond this range the destructive power of the round shot diminishes, whereas that of the common or shrapnel shell does not. The drop off in battery effectiveness should come after the GUNS exceed their effective range with round shot, howitzers will be able to fire effectively beyond that range. Within canister range they will be equally as effective, and if this is to be taken into consideration then canister range must depend upon the nationality of the battery, an even perhaps on the weight of shot.

## SCALES OF AMMUNITION

Hughes gives the following for British and French artillery circa 1800.

**Table 6. Ammunition Scales (Hughes)**

| | Round Shot | Shrapnel | Heavy Case | Light Case |
|---|---|---|---|---|
| British | | | | |
| Lt 6lb gun: | | | | |
| Axle box | 8 | | | |
| Gun limber | 32 | | 5 | 5 |
| Wagon limber | 32 | | 4 | 4 |
| Wagon body | 60 | 20 | 5 | 5 |
| Total | 132 | 20 | 14 | 14 |
| 9lb Gun | | | | |
| Gun limber | 26 | | 3 | 3 |
| Wagon limber | 26 | | 3 | 3 |
| Wagon body | 36 | 12 | 2 | 2 |
| Total | 88 | 12 | 8 | 8 |
| French * | | | | |
| 4lb gun | 118 | | 24 | 26 |
| 8lb gun | 137 | | 40 | 20 |
| 12lb gun | 153 | | 24 | 26 |

* Rogers states that the Guard Artillery had 350 rounds per gun, twice the normal allocation.

The following scales are quoted by Von Pivka. You will see that he does not quote any scale of shrapnel for the British artillery, these are therefore probably pre-shrapnel scales.

**Table 7. Ammunition Scales (Von Pivka)**

| | Round Shot | Canister | Other |
|---|---|---|---|
| Austrian Foot Artillery | | | |
| 3lb gun: limber | 12 | 20 | |
| wagon | 144 | 24 | |
| 6lb gun: limber | - | 28 | |
| wagon | 160 | 16 | |
| 12lb gun: limber | - | 12 | |
| wagon | 86 | 20 | |
| 7lb howitzer | - | 16 | 80 shell<br>3 firebombs |
| Austrian Horse Artillery | | | |
| 6lb gun: gun | - | 14 | |
| trails | | | |
| reserve | 146 | 28 | |
| 7lb howitzer | - | 3 | 71 shell<br>11 firebombs |
| Russian | | | |
| 12lb gun: limber | 8* | * | *Composition |
| ammo carts | 90 | 30 | not known |
| 6lb gun: limber | 20* | * | |
| ammo carts | 90 | 30 | |
| 'Unicorn' | - | 30 | 80 shell<br>10 firebombs |
| English | | | |
| 12lb gun: limber | 6 | 6 | |
| wagon | 114 | 18 | |
| 6lb gun heavy: | 36 | 14 | |
| limber | | | |
| wagon | 84 | 6 | |
| 6lb gun light: | 34 | 16 | |
| limber | | | |
| wagon | 154 | 52 | |
| Prussian | | | |
| 6lb gun: | 150 | 30 | |
| 12lb gun: | 130 | 20 | |
| 7lb howitzer: | - | 18 | 60 shell<br>3 firebombs<br>2 illumination<br>2 'Rebhuhner-granaten' ** |

** Literal translation is Partridge Shell ! Perhaps one of our German readers can provide more information on this ?

**Sources Quoted:**


D P Hughes: OPEN FIRE. Artillery tactics from Marlborough to Wellington.
O Pivka: Armies of the Napoleonic Era.
H C B Rogers Napoleon's Army.
D P Hughes: FIREPOWER. Weapons effectiveness on the battlefield, 1630-1850
F L Petre Napoleon's Campaign in Poland 1806-1807.