

The Transformation of Warfare: Its Results

The invention of gunpowder and that of firearms which followed are inseparably linked with one another. Together these two revolutionized warfare. Few inventions have had an impact on human affairs as dramatic and decisive as that of gunpowder. The development of a means of harnessing the energy released by a chemical reaction in order to drive a projectile against a target marked a watershed in the harnessing of energy in human needs. Before the invention of gunpowder, weapons were designed around the limits of their users' muscular strength, after gunpowder, they were designed more in response to tactical demand. Technologically, gunpowder bridged the gap between the medieval and modern eras.

Chinese alchemists discovered the recipe for what became known as black powder in the 9th century AD. The Chinese used the substance in rockets, in crude cannons, and, according to some sources, in bombs thrown by mechanical artillery. This transpired long before gunpowder was known in the West, but development in China stagnated. The development of black powder as a tactically significant weapon was left to the Europeans, who probably acquired it from the Mongols in the 13th century AD (though diffusion through the Arab Muslim world is also a possibility).

The European discoveries and conquests of the New World in the late Middle Ages could hardly have advanced far without wide-scale developments in the techniques of sailing. The invention of new types of sail, for example, made maneuvering of ships more easy. But these new aids might still not have counted for much had Europeans not been able to establish bases on the newly discovered lands or devised ways to secure their sailing routes. To the new technologies in sailing, Europeans added **new instruments of dread, above all, firearms.**

The Portuguese conquest of the Indian coast and their superiority over Arab fleets resulted from their superior firepower. Mounting, at first, a simple cannon on the forecastle of the ship's deck led quickly to adopting ways of placing more and heavier pieces of artillery on board ships. Between AD 1500 and AD 1588, the year of the Spanish Armada's defeat by England, the number of guns on a ship grew dramatically. Both Fernando Cortes's (Spanish *conquistador* who overthrew the Aztec Empire in the New World between AD 1519 and AD 1521 and won Mexico for the Spanish crown) and Francisco Pizarro's (Spanish *conquistador* whose expeditions in the New World led to the fall of the empire of the Incas and the Spanish conquest of Peru) conquests in the Americas were greatly aided by the cannons and muskets taken along for battles with the Aztecs and Incas. These firearms also added to the brutality of their conquests.

While *conquistadores* were at work brutally reducing native civilizations to the dominion of Spain, military tacticians in Europe were busy changing the art of warfare, and with this indirectly bringing about major political and social changes as well. The wide-scale production of gunpowder gave an impetus for perfecting larger – and more costly -- pieces of artillery. And huge cannons and advanced weapons were expensive; kings and emperors might afford them for their own armies, but hardly the lesser nobles who had traditionally retained sizeable armies of their own. To the expense of new artillery pieces must be added the extraordinary costs of outfitting, billeting, and paying ever larger

number of soldiers, for the common people were now joining the armies in ever increasing numbers. These soldiers were wont to revolt whenever they were not paid. Thus in a short time armies became, by necessity and by their character, a royal monopoly.

The influence of technology can be either positive or negative. The experience of the ancient Greek hoplite infantrymen is one example of positive influence. Their arms and armour were most effective for fighting in close formation, which led in turn to marching in step, which further augmented cohesion and made the phalanx a tactically formidable formation. The late medieval knight offers an example of the negative influence of technology. To wield his sword and lance effectively, he and his charger needed considerable space, yet his closed helmet made communication with his fellows extremely difficult. It is not surprising, then, that the knights of the late Middle Ages tended to fight as individuals and were often defeated by cohesive units of less well-equipped opponents. And the switch over from the heavily armoured knights, who were the backbone of European armies in the Middle Ages and who, at the same time, formed an elite component in the military organization, to the foot soldiers made possible the expansion in the size of the armies from the late 15th century AD as an infantry could be trained more quickly and as infantrymen could be hired in great numbers.

The appearance of towns changed too. Towns that have fortified themselves with high walls and steep battlements were again rendered vulnerable by the battering of cannon balls. The fortification of towns in this era generally acquired pentagonal forms both to give defensive artillery pieces multiple angles for firing and to reduce the effects of ballistic impact upon the walls. Towns also made extensive use of trenches to halt advancing horses and foot soldiers. The introduction of more accurate and large pieces of artillery thus gave rise to military science that addressed questions of fortification, defence, gunnery, siege warfare, and offensive tactics.

By the early 17th century AD military tactics had changed as well. In the early 16th century AD, the Spanish infantry had been innovative in its strategies and tactics. The armies of Spain then consisted of huge square masses of men called *tercios*, usually some 3000 to 4000 troops, who carried guns, crossbows, and pikes – highly effective weapons against the cavalry charge of well-armoured knights. Each army might have 10 to 12 such squares which could be positioned for maximum effect. By the early 17th century AD, however, the weaknesses in these tactics had been exposed. In their revolt against Spain, the Dutch used new tactics on the heavy Spanish armies. Sacrificing cumbersome strength for flexibility and speed, the Dutch learned to throw their muscle bound opponents off guard and inflict devastating casualties. In the Thirty Years' War (AD 1618-1648), King Gustavus Adolphus of Sweden refined this further and built up the most formidable army in Europe. As part of these tactics the Swedish king introduced a new lightweight cannon which could be moved from station to station on a battlefield.

The effect of new military strategies was also seen in the seas in AD 1588 during the naval encounter between the Spanish Armada and the faster ships of Sir Francis Drake and other English captains. By the 17th century AD, well-armed English ships could boldly prey on Spanish shipping, or move at will up and down Spanish coasts and fire upon unprotected towns and villages. With national armies and navies

requiring the addition of ever greater numbers of soldiers and sailors, glimpses of modern warfare became more and more visible.

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