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Taking Ownership of Distance in the Stone Age With Spear, Atlatl, and Archery: Prehistoric Weapon Systems and the Domination of Distance

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The history of weapons is of crucial importance to the study of comparative civilization. Some of the most important technological advances in all civilizations were the result of human beings attempting to gain military advantage. In this paper I will look at three key weapons, the spear, the atlatl and the bow and arrow. While there is a fair amount of research on the spear and the bow and arrow, there is relatively little on the importance of the atlatl. This paper corrects the deficit. We will show that in addition to the spear and bow and arrow, the atlatl played an important role in increasing the distance from which one could attack or defend against an enemy, prey, or predator.

In the beginning there was a rock. A rock is an efficient weapon as far as it goes. Part of my family hails from Northern Ireland and the modern counterparts of the rock, specifically the cobblestone and the brick, have served valiantly in that locale as projectile weapons, delivered with sometimes surprising aerodynamic stability and accuracy by those on both sides of the political difficulties. But rocks and their modern counterparts are inelegant and more importantly very difficult to carry around in constant readiness. Further, the “technology” of the unfinished rock was available to all equally, and so gave its possessors little comparative advantage. It is not surprising, therefore, that in the earliest times alternatives to the rock were developed.

Three significant weapon systems appear during the Stone Age, which, in concert with other basic survival strategies, helped early humans to survive and then thrive under often extremely adverse conditions. These three weapon systems were so significant and of such simple and technologically sound design and importance they would continue in recognizable form and be used in the military operations of civilized peoples well into the second millennia of the Common Era. These three systems are the spear, the dart thrower (atlatl), and archery.

Critical not only to the survival of our very early ancestors, these basic systems and their realized potential would help form military thinking and actions in civilizations which would eventually follow. These systems existed as tools and, as in any craft, the product of the craftsman is shaped in good part by the tools, materials and technology available to him. These systems would help shape the world in which we live today.

These systems were probably developed and improved over time by many generations of humans, some of whose innovations speak to the exceptional genius of early humanity. From the perspective of our modern world, where almost every student (in

an industrialized country) has virtually limitless knowledge available at his or her fingertips, and so much food that obesity is becoming epidemic, it is difficult to imagine or truly appreciate the immensity of these innovations or the circumstances and conditions under which they were made.

Each of these three systems offered critical technological advances and aided early humans to survive, to dominate areas they chose to occupy, and to thrive through the ability to take adequate game, thereby providing sufficient food. The systems were so sound in their basic concepts and designs that they would work effectively in extremely varied environments and could be manufactured from a wide assortment of raw materials.

When used alone, each system was limited in the extent of its performance. The spear, although a near perfect close-quarter weapon and always ready for use, had a very limited range and area of domination. The atlatl, though having incredible range compared to the spear, and sharing the spear's constant state of immediate readiness, was limited in how many projectiles could be carried by a hunter, and it could not perform well as a close-quarter defensive weapon.

Archery, having the highest level of technology of the three systems, the longest accurate range, and the potential to carry larger numbers of projectiles, had serious deficiencies in that the bow could not, in most cases, be kept in strung condition, and therefore was not always immediately usable. In addition, the bowstring, even into the medieval period, was vulnerable to water and needed to be kept dry. When two or all three of the systems were used in concert, they complimented each other and could give man an almost unbeatable edge in defense against animal predators and an advantage in hunting as well as in conflict with other humans not so equipped.

Technology alone is never sufficient on its own. Technology requires clever, motivated, intelligent, and responsible human involvement, direction, and operation. The weapon systems described were created at times and in conditions where there was no guarantee humans would survive as a species. The successful operation of these very basic tools required an understanding and respect for the natural world, its resources, and the animals with which they shared the world.

Motivations and Resources

Members of our species, when so inclined, are potentially the deadliest predators on the planet. However we are physically designed more in the image of prey. We lack claws, fangs, antlers, horns or tusks, are comparatively weak and slow, and carry just enough muscle mass and fat to make killing us profitable to predators searching for meals. Perhaps our natural frailty and vulnerability is the motivation to develop survival technologies.

What we, as humans, do have in our favor is more important than natural weapons, speed or strength. We have physical endurance, the will to compete and survive, hands with which to manipulate our environment and the raw materials within it, and, most importantly, brains with which to think and imagine. We have the ability to visualize that which has never existed before, to see potential in inanimate objects, and then to fashion and create the artifacts imagined in our thoughts. We confront problems, create solutions, modify materials, adapt to change, and overcome obstacles. We also have the ability to communicate with other members of our species by physical demonstration, signs, and language.

Evolution gave humans the advantage of greater intelligence, but otherwise humans are the perfect physical prey; thus man must rely on survival strategies rather than natural strength. Survival strategies include many avenues such as making and using fire, twisting or braiding fibers and sinew into thread and cord, flaking and grinding stone or carving bone and antler into tools, fashioning efficient, tailored clothing against the cold, making storage containers, and drying and preserving food.

In wild, predator-inhabited environments, distance becomes a significant key to survival. If man can control and dominate distance he can avoid the fangs and claws of predators, and the horns, antlers and kicking hooves of those animals he wishes to use for food. Distance can be controlled and dominated by the use of weapon technologies, and here it is all about distance.

The ownership and control of distance is not only of importance to survival, hunting, and human conflict applications, it is also a proto-concept that leads slowly but inevitably to settlements and the eventual creation of civilizations. It is not much of a conceptual leap to go from, “this area is mine right now (by force of arms),” to this area (property) is mine.”

The seeds of the concept of real property exist in the very first deployments of sharpened sticks to defend those small pieces of ground where early man refused to turn and run away. At that point man began his pursuit of dominion of the earth and the long climb to civilization.

As humans we understand that we will die. It is unequivocal and inevitable and in the immediate world of the Stone Age was something faced on a daily basis. On the other hand, when a lion or bear charges, it does not think it might die on the human’s spear. The human holding the spear and bracing for contact clearly knows his survival is not guaranteed, that he may die, and he understands the impact his death would bring to his small, fragile family group. Thus there is clearly motivation for humans to develop, perfect, and effectively use technology.

Technological Connections and the Evolution of Armaments

The spear, the atlatl and archery are more closely related than they might at first appear. A closer look at the three systems reveals very strong relationships between the systems and the likelihood of an evolution amongst them as opposed to independent development.

The spear: alpha and omega of the three early weapon systems

The spear is the alpha of the three systems because of its simplicity and because it was the first of the three systems to be developed, as early as 500,000 to 780,000 years ago. It is the omega because unlike the dart thrower and archery, which currently exist primarily for recreational uses, the spear in its modern manifestation continues to exist in a tactical environment around the world as the bayonet on a battle rifle. Over the millennia the defense concept represented by the spear has kept its value. The bayonet's purpose is to kill but its true value is in defense.

The spear is the first truly significant early weapon system. A rock can kill small and medium size game, but a rock thrown by human hands is unlikely to stop a large charging animal. Rocks of sufficient size to be adequate killing weapons are not practical to carry around and would need to be used at prepared ambush sites or as weapons of opportunity, if available, during times of need. The spear was the game changer because it did what no other early weapon system could do: it could be easily transported, kept close and ready at hand, and it put a physical barrier between man and predator (or man and angry, charging game). For the dangerous animal to get to man it must then first overcome the spear.

The spear is the first weapon system used to effectively establish the concept of area denial. It is a small area to be sure, but in concept as well as in implementation (with a skilled, healthy and lucky hunter-warrior) it is an absolute. There is no argument or discussion. Entry is simply denied; the human's first personal space is enforced. As weapon technologies advance, the area under man's control increases proportionately (until the point where human challenges human and then comes argument, discussion, and too frequently the tactical employment of weapon technology).

For the spear to work effectively, it must have certain simple but necessary characteristics: the shaft must be strong and of suitable diameter for maintaining a grip in violent encounters and it must be long enough to keep threats at a "safe" distance. It also requires a sharp and lethal point. The spear must be maneuverable as not all attacks are frontal charges, especially when made by predators operating in hunting teams or packs.

Modern military and police tacticians use the term “close quarter battle” (CQB) to define conflict in immediate proximity to threats. The basic stone-age spear existed in this type of CQB environment. Threats were immediate, attacks direct, indirect, and dynamic, and to kill or be killed was the rule.

The spear can be used as a stabbing, thrusting, and throwing weapon as well as a moveable barrier or impalement weapon, making it a perfect CQB system. A significant benefit of the spear is that, once fashioned, it is always ready to use. If well fashioned and designed, and constructed of suitably strong materials, there is little to go wrong with it.

The most significant limitation of the spear is that it controls very little area, even when used as a throwing weapon. If used as a throwing weapon, secondary or alternate weapons need to be available to replace the thrown spear.

The spear alone did not give man an edge in defense against predators so much as it effectively leveled the playing field for the first time. Before adopting the spear, man existed in an asymmetrical relationship with predators, with the advantage on the side of the predators. The spear gave man a fighting chance to survive against most dangerous, aggressive predators. The spear became man’s de facto fangs and claws.

Considering the vast variety of hunting spears developed through the ages and across the globe, diversity was also likely in very early times as well. As humans, we adapt to changing conditions and opportunities as they avail themselves. Early spears evolved into many specialist forms including spears with multiple barbed prongs for taking fish and eels, and long, light throwing spears for taking water fowl and other game at short distances. Throwing spears existed for larger game but were proportionately heavier to be effective.

It is very likely that spears primarily designed for throwing evolved into the darts used in atlatls. Small game throwing spears and atlatl darts share many of the same characteristics, and all of the same objectives. Throwing a spear and throwing an atlatl dart is also basically the same physical movement on the part of the hunter. The difference in the throw is the addition of the atlatl, which acts as a jointed extension of the throwers arm. Technologically the increase in power is obtained by the atlatl contacting the back of the dart (rather than the throwers hand holding the shaft of the spear) allowing the dart to bend against resistance and load energy. The hunter does touch the shaft of the dart but only enough to hold it in place on the atlatl prior to the throw.

The atlatl dart system most likely came from people with a vigorous and aggressive hunting tradition where taking game at greater and greater distances was a desired objective (or a survival imperative), and it is more than likely that they already used efficient throwing spears before developing atlatl technology.

The Atlatl: the evolutionary bridge between spear and archery

The dart thrower, commonly referred to in English speaking countries as the *atlatl*, is an offensive weapon used to deliver lethal force at a distance. It has value in both hunting and military contexts. Tests have shown that the atlatl provides an increase of 60% in thrust. The atlatl thus increases the range at which man may take game or initiate hostile engagement with enemies. It is not an effective defensive weapon in close confines; its darts are generally too weak, light and flexible to serve as spears or efficient stabbing weapons.

Darts used in the atlatl are generally long, flexible, and light. Like an arrow the darts are usually fletched with feathers at the back of the shaft for stability in flight. Oddly, unlike arrowheads, there is little correlation between dart tip size and shaft size.

General observations from current atlatl enthusiasts, including my own observations and research, indicate that most atlatls are and likely were somewhere in the 20 plus inch range but the variation in atlatl lengths is significant. The shortest reliable artifact atlatl I located during research was seventeen inches long (Peru) and the longest forty-four and a quarter inches (Australia). Longer atlatls tend to make for harder, longer and more powerful throws. Shorter atlatls tend to make for more accurate throws. Since both power and accuracy are desired characteristics of a working weapon system a compromise is necessary between the two.

Atlatl darts are generally much longer than modern day arrows although some South American arrows still in use today can rival the lengths and appearance of some modern atlatl darts. Modern traditional style dart shafts are mostly fashioned from wood or river cane and have stone, bone, antler or copper points.

The observations of modern atlatlists indicate the atlatl is by any measure an impressive weapon system, and the archaeological record testifies to the effectiveness of the atlatl.

Archery: perfection at the end of evolution?

Archery is very old, going back at least 64,000 years. As practiced in early prehistoric times, archery consisted of a system whereby arrows were propelled with accuracy and power from a bow for the purpose of hunting or warfare.

Unlike the spear or the atlatl system, archery required a more involved technological process to make a working weapon system. Arrows were fairly straight forward to manufacture, being in form, construction, and function very much like smaller versions of atlatl darts and using the same general techniques to manufacture. The bow and bow

string, however, were a new type of technology requiring the ability to manage much stronger stresses.

The spear, atlatl and atlatl darts had been fairly simple to manufacture, as were the arrows for the new weapon system of archery. The spear, atlatl and darts, and the new arrows, all faced relatively simple stresses in use. The spear was required to stand up to the torque of vigorous combat once a penetration was made, but it was very much just a strong tool-handle used to deliver a tool-head in the form of a point. The atlatl faced the least amount of stress in these early systems, being in effect a small hand tool that used a spur to throw a light and flexible dart. The atlatl dart did load energy during a throw but its purpose was swift flight to deliver a sharp point accurately and at a velocity sufficient to penetrate and kill.

With the bow, weapon technology entered a whole new world, a world of energy stored under pressure. A bow had to be bent without breaking in order to be strung. It then needed to be bent even further, under greater pressure, with an arrow placed on the string and when the string was released it needed to transfer energy from the bow, through the string to the arrow. At this point in the operation the arrow acted much as an atlatl dart did when it was thrown. The arrow would bend against the bow loading energy and then straighten as it left the bow flying toward the target.

The string of the bow needed to be incredibly strong but could easily be made from sinew or other naturally strong fibers.

The bow was as significant an advance in technology as had been the atlatl. The bow could deliver an arrow faster and farther than possible with an atlatl dart, and with great accuracy.

Very early arrows were likely close in appearance to atlatl darts, especially in regions where suitable shaft material was abundant. In parts of South America, where prehistoric technologies continue to be practiced by indigenous peoples, the arrows used are frequently as long as six feet. The availability of materials from which to fashion arrow shafts and bows varied by region as well as by changing climate conditions. In many areas suitable materials for the construction of darts, bows and arrows may have been very limited, requiring innovation or the use of less desirable materials. Some of the earliest arrow shafts discovered in Europe, used in association with reindeer hunting, were made from pine.

As the spear changed through the ages so did the bow and its arrows. Bows were fashioned from a variety of materials including wood, bone, sinew, and horn, and re-curve technology was introduced where the two ends of the bow were bent forward to give even greater speed to the arrow. In time most arrows became shorter and some arrow points became very small. As arrows decreased in length and weight their range

and speed increased dramatically. Bows of any significant draw weight could still not be left strung for long periods of time without seriously weakening the weapon's power, and the bowstrings remained vulnerable to water but their value was unchallengeable.

With the development of the quiver to hold arrows in readiness, and the large scale manufacture of arrows in early civilizations, archery took its place as a critical military asset. For the first time a weapon existed that could reliably deliver large numbers of accurate, long range, and deadly projectiles. With ranks of archers shooting standardized bulk arrows the game changed again.

Imagine a relief carving of an Assyrian warrior with braided beard, re-curved composite bow and a quiver of matching arrows. At his side is an innovation, a sword. He is with other warriors, some with bows and some with spears and shields, and they are members of an advanced, ordered, and civilized military system. History begins but the technological innovations of prehistory have left their mark and shaped the future.

Conclusions

Most importantly, the spear, the atlatl, and archery allowed humans to survive and subsequently to form our civilizations. The spear and the atlatl were especially important to our survival during the Ice Age. During the Younger Dryas (12,900 to 11,600 years ago), a still critical time for humans with extreme cold inhibiting an increase in the population, archery appears in Europe, replacing the atlatl in reindeer hunts as a more efficient weapon system. The spear, the atlatl and archery, in their own times, and in concert with other survival strategies, allowed humans to survive.

The three weapon systems had another long term effect influencing society. Hunting was initially of critical importance to man in supplying animal protein, and in places remains so today, but after the domestication of animals its critical importance in obtaining food diminished significantly, although as a male dominated activity it continued to thrive. Hunting large animals, especially with spear, dart, and archery, is a violent and brutal activity and perfectly suited for rites of passage, as well as to train and harden warriors.

Weapon systems had immeasurable effect on group society and in the long run on civilization. In any endeavor the methods we use are defined, as well as limited, by our tools and these items are the tools of war, defining by how they work military thought and the way wars are fought. Without the development of the spear and subsequently the atlatl and the bow, our concept of war would be different. Imagine the Legions of Rome, the Mongolian horsemen of Genghis Khan, or the English soldiers at Agincourt armed with bags of rocks.

It does matter to us that these technologies were developed. Without their development it would be a different world. The fact that early civilizations developed at all beyond small cities was influenced in great part by their ability to conduct war, to directly control large geographical areas and to press their influence beyond their borders.

The early civilizations, using chariots, were devastating in their military capabilities, but the chariot was primarily a delivery system for a warrior using arrows and spears. On its own, the chariot was technologically interesting but without weapon systems it would lack much of its purpose.

Brigadier General Chuck Yeager, USAF, once said that an airplane (in a military context) was just a platform on which to mount a gun. That is no different in concept from an Assyrian, Hittite, or Egyptian chariot delivering the weapon systems of spear, javelin and archery. Distance is dominated by weapon systems, and in large scale conflicts, whether in the ancient world or the modern, by the ability to transport men and weapon systems to where they are desired. The conquest of distance is therefore the key to understanding the importance of early weapons technology. It was the ability of humans to carve out spaces of their own that made the concept of property viable. It was the ability of humans to defend an area that made the development of cities possible. And with the rise of cities and greater cooperation, further technological developments became possible. But in the beginning were the spear, the atlatl and the bow.

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