Neanderthals: The First Spear Throwers?
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Abstract
Before 1995, Neanderthals were believed by many to be mentally and physically incapable of throwing a spear as a long-range weapon. However, the discovery of the Schöningen spears in 1995, sparked a debate over Neanderthal capabilities and whether there was enough evidence to say these spears were indeed thrown. Some say these spears were too heavy and long to be thrown and were therefore thrust. However, this research project examined spears found in the literature accessed through eHRAF, electronic Human Relations Area Files, and other databases that show usage of unwieldy throwing spears found in modern societies. This presence of similar spears can serve as evidence for the possible usage of the Schöningen spears as projectile weapons. Additionally, a team of Anthropology and Physics professors and students was formed to conduct experiments with Schöningen spear replicas to test the flight capabilities of the Schöningen spears. After considering many methods of propulsion, the team settled on a hybrid spear-dart propelled by an air bulb. This method produced penetration, but was not sufficient to cause fatal harm to the simulated prey. However, the literature indicates that Neanderthals were likely able to throw at higher speeds and the full spears would have had higher masses and have been created with a harder wood than was achieved in this experiment. Given these conditions, with a more accurate speed, mass, and material, penetration is still possible.

Introduction
Homo sapiens neanderthalensis is a subspecies of the genus homo that inhabited the European continent from approximately 400-25 kya. Despite being humanity's closest relative and existing for thousands, they are consistently viewed as beings incapable of basic survival skills. Discovered in 1995 among stone tools and animal bones, five wooden spears were found at Schöningen dating from 400- 300 kya and were made from spruce or pine trees. The spears are pointed at both ends and range from 1.82- 2.50 meters in length. These spears are weighted in the first third of the object, which is typical of throwing spears and resembles modern javelins. These spears were found among horse remains numbering to at least 19 individuals, which suggests an organized hunt of a herd. There is much debate on whether these were throwing or thrusting spears. A study examining the high trauma rates in Neanderthals by Berger and Trinkaus (1995) suggested that the only modern sample with similar trauma rates were rodeo riders. From this, they inferred that Neanderthals must have hunted prey in close-quarters battles. This image stuck, despite the fact that it was only one of the suggestions offered by Berger and Trinkaus. Following on this idea, some cite lack of difference in arm anatomy that would indicate habitual throwing (Churchill and Rhodes, 2009). However, there is no experimental research that tests the speeds necessary to penetrate the hide similar to that of the horse heard found at Schöningen.

Research on Ethnographic Data
A significant portion of the ethnographic research was conducted with the use of the electronic Human Relations Area Files (eHRAF). With this database, I was able to query ethnographic data on over 1,000 different cultures collected by anthropologists from the early 20th century to the present. With additional research, I was able to create a comparative database of spear descriptions for comparison with the Schöningen spears. Below is a subsection of the most significant examples:

<table>
<thead>
<tr>
<th>Area</th>
<th>Supplier</th>
<th>Material</th>
<th>Tool Type</th>
<th>Description</th>
<th>Pray</th>
<th>Source</th>
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</thead>
<tbody>
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<td>“throwing”</td>
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<td>Davidson 1934</td>
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<tr>
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<td>N/A</td>
<td>N/A</td>
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<tr>
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<tr>
<td>North America</td>
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<td>N/A</td>
<td>N/A</td>
<td>Davidson 1934</td>
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<tr>
<td>South America</td>
<td>N/A</td>
<td>wood</td>
<td>N/A</td>
<td>N/A</td>
<td>Davidson 1934</td>
<td></td>
</tr>
</tbody>
</table>

Experiment Info
One of the goals for this project was to design a contraption that could propel a replica spear at high speeds so that we could test the flight capabilities of these spears. The desired speed was set at 30 meters per second since this is the speed of an Olympic javelin thrower. While not all Neanderthals would have had Olympic speeds, given the facts that this skill would have increased their livelihood and that they indeed were much stronger than the average Olympic javelin thrower, the speed of 30 meters per second is a reasonable goal.

The replica spears were created using sycamore, a similar wood in terms of hardness on the Janka scale to spruce and pine. However, the wood used for the Schöningen spears was from a different species. The replica spears were thrown at a target from approximately 15 feet away constructed by a cowhide covering ballistics gel.

Experiment #1
Based on previous experiments and resources available, the first method of propulsion attempted was firing the spear from a ballista constructed with wood and solid steel rods and plates. However, after a few uses, we bent the solid steel rods and plates. Even though we were weirdly held; 40 1.5 meters, and 20 2.5 meters, we were not able to exceed 11 meters per second.

Experiment #2
Upon further consideration of resources and time, we attempted to reach desired speeds through the use of an air bulb and hybrid spear-dart. This spear-dart utilized 30 cm of sycamore for the tip and was attached to the length of a dart. While this decreased the total mass of the object, we believed it more likely to achieve the desired speed.

Acknowledgements
Thank you Kenyon College professors and students who could not survive by hunting with throwing spears, but that does not mean that Neanderthals were incapable of doing so. Even though this spear-dart had a considerably lower mass, the wood was softer than the actual Schoeningen spears, and the fact that the average anatomically modern human is much weaker and unskilled than the average Neanderthal, we were still able to achieve penetration. With these results in mind, it is no unreasonable to say that with more accurate materials, skills, and speed we could achieve significant results that when paired with modern ethnographic data could support the presence of spear throwing in Neanderthal hunting techniques.

References