Modern Human Arm Velocity and Hominid Stone Tool Production

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- **Is there a correlation between forearm length and velocity that can be used to determine the maximum force a hominid could produce during stone tool production?**

Introduction

- The earliest archaeological evidence of hominid stone tool production dates back to 3.3 million years ago.
- Oldowan stone tools, which consisted of flakes of a rock being chipped off by another rock, dates back to 2.6 million years.
- The production of Acheulaean stone tools dates back to approximately 1.7 million years ago and is typically associated with Homo Erectus and species such as Homo Heidelbergensis.
- Stone tools of the Acheulaean era are recognized as "handaxes" and were unique in the sense that they were oval-shaped and larger than 10 centimeters.

Methods

- The relationship between forearm length and velocity was tested in modern humans in order to determine how the relationship would have affected hominid force during stone tool production by:
- Measuring the forearm length of 14 modern Homo Sapiens.
- Using a laser targeted speed indicator to determine the maximum velocity projected by each person when moving the forearm in a knapping motion.
- Having each participant move their arm through the laser beam five times and averaging results.

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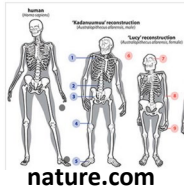

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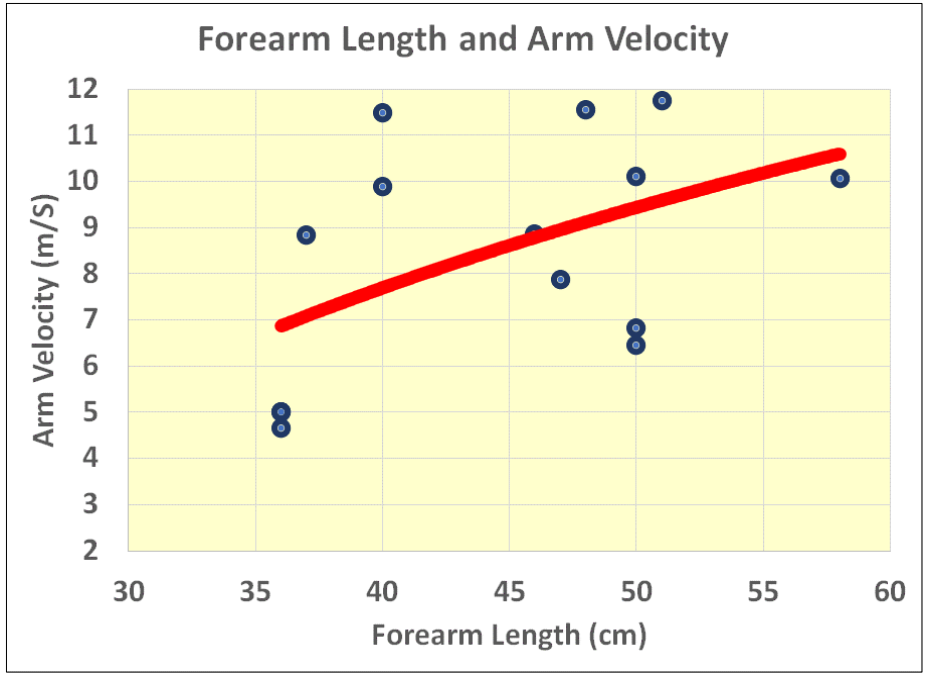

Results

- The Pearson correlation coefficient of 0.5 reveals that there is a moderate positive correlation between forearm length and velocity.
- Given that the correlation is only moderate, other biomechanical variables probably interfered during the calculation of arm velocity.

Conclusions

The data reveals that as forearm length increases so does arm velocity capability. This would suggest hominids with longer forearms achieved higher velocity and thus higher force during stone tool production than those with shorter forearms. Again, this would suggest Australopithecus probably exerted more force than Homo genus and Homo Erectus likely produced more force than Homo Floresiensis. However, flakes of the Acheulean associated with Homo Erectus are the largest known in the archaeological record. Therefore additional variables need to be considered such as strength, technological aids or position.