

Comparison of Measurement Accuracy Between Caliper and iPhone Apps

Introduction

- Measurements of wild live shell and shell artifacts can help us monitor and understand past and present environmental changes. (Dong et al., 2018)
- Measuring live shell can also be useful in determining the most efficient and effective farming methods. (Capelle et al., 2020)
- Measurements of bone artifacts can give insight into the influence of ecological resources on survival and health of area inhabitants. (Grosjean et al, 1997)
- Calipers are the traditional tool used for accurate measurements in scientific settings.
- Smart phones are easily accessible, on hand always, and can save data without extra tools being needed.
- How accurate are measurement apps in measuring artifacts?

Methods

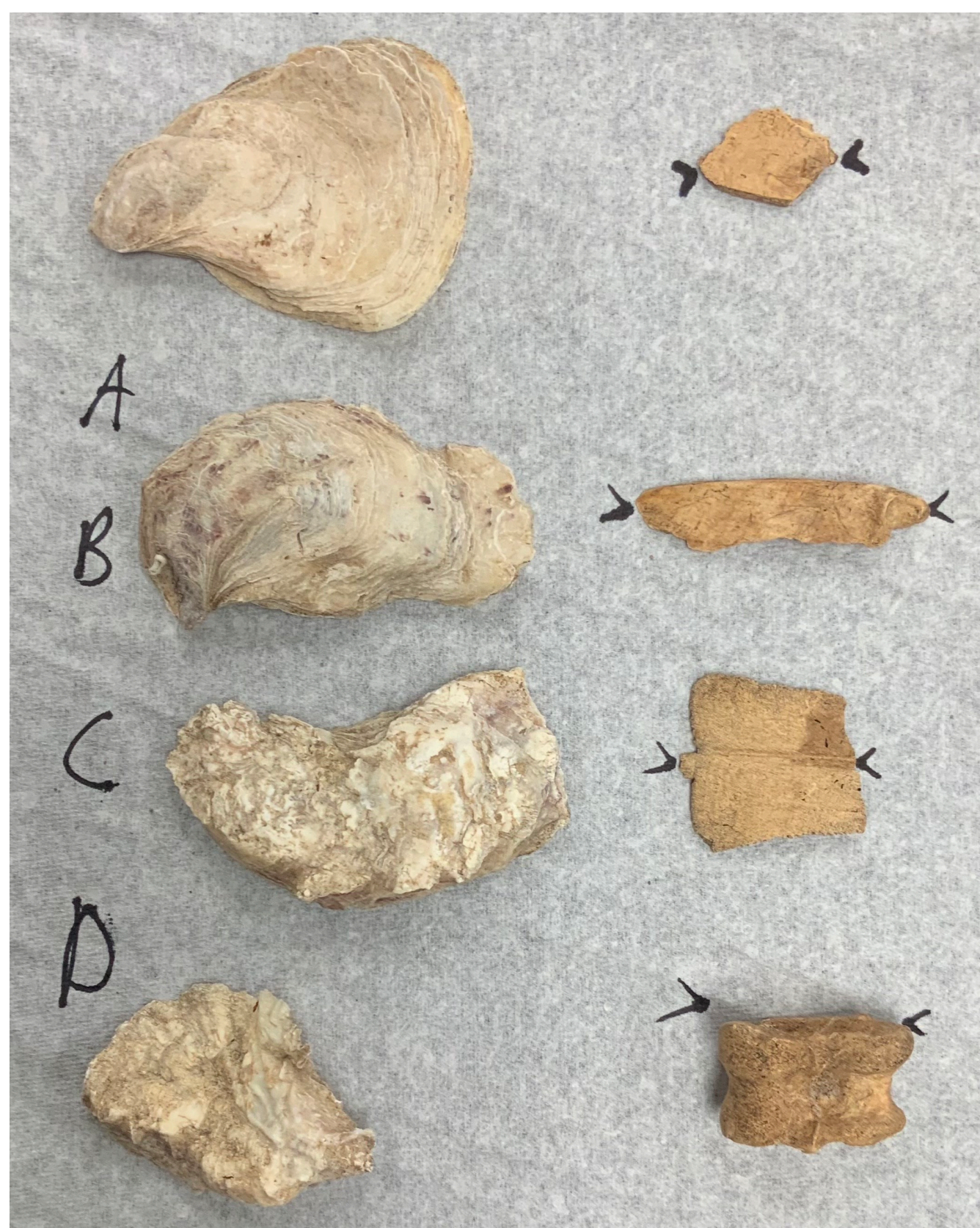


Figure 1: Samples of shell and bone artifacts that were measured with the calipers and 2 iPhone apps. Black triangles represent points of measurement on the bone artifacts. Shells were measured along their mantle.



Figure 2: Ruler App measurement



Figure 3: ARuler App measurement

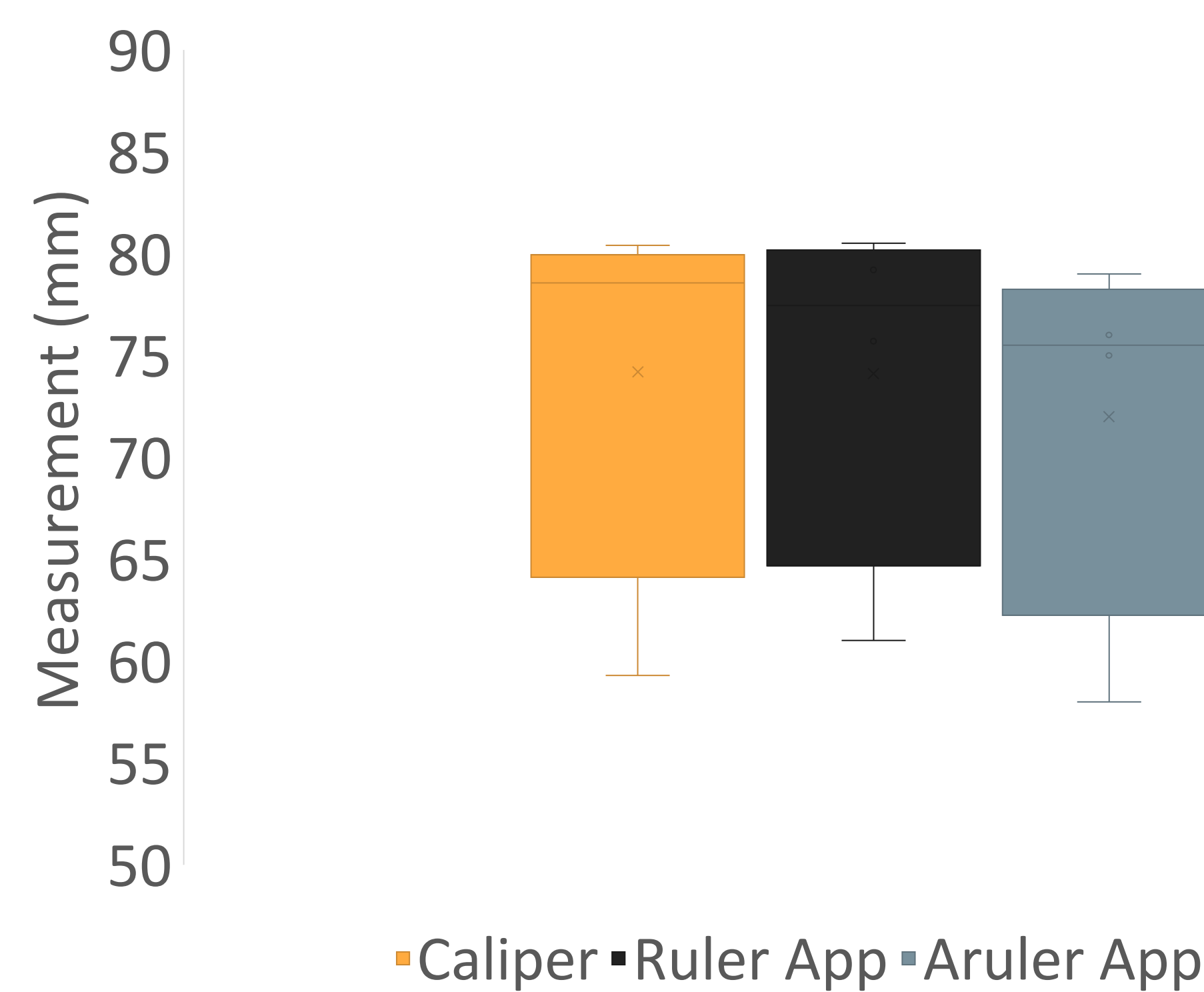


Figure 4: Box and Whisker plot of shell measurements from Calipers, Ruler App, and ARuler App.

Results

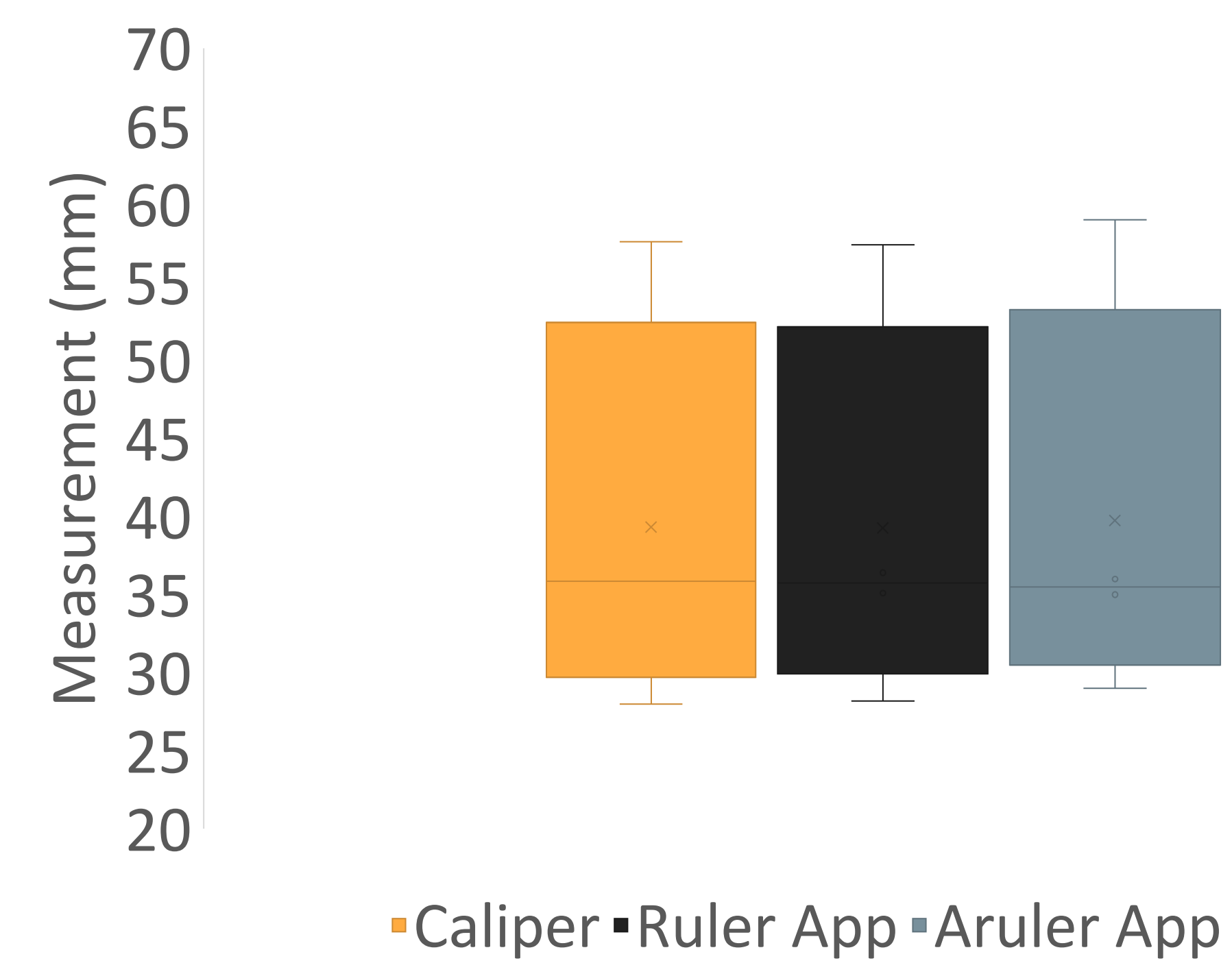


Figure 5: Box and Whisker plot of bone measurements from Calipers, Ruler App, and ARuler App.

Box and whisker plots of both shell measurements (Fig 4) and bone measurements (Fig 5) did not show much difference between measurement devices.

The data was analyzed with an ANOVA. The resulting p-value was 0.998, showing no significant difference between the measurement methods.

Conclusion

- Each shell artifact was measured with Calipers, Ruler App, and ARuler app.
- Each bone artifact was measured with Calipers, Ruler App and ARuler app.
- Measurements were logged into a table.
- Box and whisker plots were used to evaluate shell data and bone data symmetry individually and see if the data means were comparable to the medians.
- An ANOVA test was run to see if there was a significant difference between any of the measurement techniques.

- The results of this experiment show no statistical difference in the measurements taken using a Caliper vs measurements taken on an iPhone apps, indicating the apps are adequate for measuring artifacts
- The Ruler App was closer to the caliper measurement than the ARuler App
- Although the measurements may not be statistically significant, it would be prudent of any scientist to continue to use calipers for measurement as a difference of 0.5 mm can be important.

References

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