ORIGINAL RESEARCH ARTICLE

Diagnostic biface acquisition through trade with distinct extralocal communities of practice: A case study from the American Southeast

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ABSTRACT
Nodule size and mechanical flaking properties have been advanced to account for assemblage level differences in the morphology of stone tools within regions where raw material is abundant. However, in instances where lithic raw materials—larger nodules in particular—were scarce, did traders interact with brokers from distinct extralocal communities to acquire large bifaces? Gahagan bifaces are among those implements diagnostic of Formative/Early Caddo material culture (CE 800 - 1250); although, due to a lack of local production evidence, it is also widely accepted that Gahagan bifaces were not manufactured by the Caddo. This study asks whether Caddo traders engaged in commerce with brokers from discrete extralocal communities of practice to acquire Gahagan bifaces. Results demonstrate significant differences in Gahagan biface geochemistry and shape based on color group assignment, suggesting that Gahagan biface shape was conditioned by raw material color. Given these findings, it is posited that Caddo traders acquired Gahagan bifaces from two distinct communities of practice, where local raw material and production differences resulted in Gahagan bifaces that were unique in color, geochemistry, and shape.

KEYWORDS
American Southeast; Caddo; NAGPRA; lithics; raw material color; pXRF; computational archaeology; museum studies; digital humanities; non-Western art history; STEM; STEAM

"The question of questions for mankind—the problem which underlies all others, and is more deeply interesting than any other—is the ascertainment of the place which man occupies in nature, and of his relation to the universe of things." –**H. Thomas Henry Huxley**, *Man's Place in Nature*

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1. Introduction

2. Methods and Results

3. Discussion and Conclusion

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Disclosure statement

The authors declare no conflicts of interest.

Data management

All data and analysis code associated with this project are openly available through the GitHub repository, which is digitally curated on the Open Science Framework (DOI 10.17605/OSF.IO/3JB94). Additionally, images of all Gahagan bifaces used in this study are openly available to view/download through an open access comparative collection (`https://scholarworks.sfasu.edu/ita-gahaganbiface/`). The supplementary materials include all analysis data and code used in the study, providing a means for others to reproduce (exactly) those results discussed and expounded upon in this article. The replicable nature of this undertaking provides others with the means to critically assess and evaluate the various analytical components of this study (Gray and Marwick 2019; Peng 2011; Gandrud 2014), which is a necessary requirement for the production of reliable knowledge.

Reproducibility projects in psychology and cancer biology are impacting current research practices across all domains. Examples of reproducible research are becoming more abundant in archaeology (Marwick 2016; Ivanovaitė et al. 2020; Selden Jr., Dockall, and Dubied 2020; Selden Jr et al. 2021; Selden Jr. 2022), and the next generation of archaeologists are learning those tools and methods needed to reproduce and/or replicate research results (Marwick et al. 2019). Reproducible and replicable research work flows are often employed at the highest levels of humanities-based inquiries to mitigate concern or doubt regarding proper execution, and is of particular import should the results have—explicitly or implicitly—a major impact on scientific progress (Peels and Bouter 2018).

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References

Gandrud, Christopher. 2014. *Reproducible Research with R and RStudio*. The R Series. London: CRC Press.

Gray, Charles T., and Ben Marwick. 2019. *Truth, Proof, and Reproducibility: There's No Counter-Attack for the Codeless*, book section Chapter 8, 111–129. Communications in Computer and Information Science.

Ivanovaitė, Livija, Kamil Serwatka, Christian Steven Hoggard, Florian Sauer, and Felix Riede. 2020. "All these Fantastic Cultures? Research History and Regionalization in the Late Palaeolithic Tanged Point Cultures of Eastern Europe." *European Journal of Archaeology* 23 (2): 162–185.

Marwick, Ben. 2016. "Computational Reproducibility in Archaeological Research: Basic Principles and a Case Study of Their Implementation." *Journal of Archaeological Method and Theory* 24 (2): 424–450.

Marwick, Ben, Li-Ying Wang, Ryan Robinson, and Hope Loiselle. 2019. "How to Use Replication Assignments for Teaching Integrity in Empirical Archaeology." *Advances in Archaeological Practice* 8 (1): 78–86.

Peels, Rik, and Lex Bouter. 2018. "Humanities Need a Replication Drive Too." *Nature* 558 (7710): 372. `https://www.ncbi.nlm.nih.gov/pubmed/29921855`.

Peng, Roger D. 2011. "Reproducible Research in Computational Science." *Science* 334 (6060): 1226–7. `https://www.ncbi.nlm.nih.gov/pubmed/22144613`.

Selden Jr., Robert Z. 2022. "Morphologically Similar, but Regionally Distinct: Perdiz Arrow Points from Caddo Burial Contexts in the American Southeast." *Lithic Technology* (in press). `https://doi.org/10.1080/01977261.2022.2095492`.

Selden Jr, Robert Z., John E. Dockall, C. Britt Bousman, and Timothy K. Perttula. 2021. "Shape as a function of time + raw material + burial context? An exploratory analysis of Perdiz arrow points from the ancestral Caddo area of the American Southeast." *Journal of Archaeological Science: Reports* 37: 102916.

Selden Jr., Robert Z., John E. Dockall, and Morgane Dubied. 2020. "A Quantitative Assessment of Intraspecific Morphological Variation in Gahagan Bifaces from the Southern Caddo Area and Central Texas." *Southeastern Archaeology* 39 (2): 125–145.