

Experimental Archaeology and Technological Variability: Explanatory Endpoints and the Risk of Methodological Post-Truth

Hugo G. Nami 

Paleomagnetism Laboratory Daniel A. Valencio, Geological Sciences Department, FCEN, UBA, Buenos Aires, Argentina
Email: hgname@fulbrightmail.org

How to cite this paper: Nami, H. G. (2026). Experimental Archaeology and Technological Variability: Explanatory Endpoints and the Risk of Methodological Post-Truth. *Archaeological Discovery*, 14, 115-124.

<https://doi.org/10.4236/ad.2026.142006>

Received: January 11, 2026

Accepted: February 7, 2026

Published: February 10, 2026

Copyright © 2026 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Experimental archaeology plays a central role in lithic studies by exploring the technical feasibility of proposed manufacturing procedures. However, its interpretive value depends on how experimental results are integrated with archaeological variability. This paper argues that experimental archaeology does not provide proof of past technological practices, but rather identifies technological possibilities under controlled conditions. Focusing on recent experimental work on fishtail projectile points, it is shown that reliance on selective archaeological samples and the uncritical generalization of experimental outcomes may lead to a form of methodological post-truth, in which experimentally plausible technical solutions are retrospectively transformed into normative interpretive models. By distinguishing general technological principles from normative production schemes and by emphasizing variability as a constitutive feature of lithic technologies, this paper advocates a reflexive and epistemological approach to experimental archaeology that strengthens, rather than constrains, archaeological interpretation.

Keywords

Experimental Archaeology, Epistemological Reflexivity, Lithic Technology, Technological Variability, Equifinality, Replication, Methodological Post-Truth

1. Introduction

Experimental archaeology has long been regarded as a productive methodological avenue for approaching past technological practices (Coles, 1979; Mathieu, 2002; Eren et al., 2016; Nami, 1991, 2010, 2018, 2022, 2024). Through replication and

controlled experimentation, it allows researchers to explore technical feasibility and to refine our understanding of material constraints, decision-making processes, and technological possibilities. In lithic studies, experimental approaches have been particularly influential in assessing how specific artifact configurations may be achieved. Nevertheless, the epistemological status of experimental results—and the inferences derived from them—requires continued critical scrutiny (Ascher, 1961; Wylie, 2002; Nami, 2011a, 2011b, 2018; Eren et al., 2016; Eren & Melzer, 2024).

While the issues discussed here are exemplified through specific South American cases, the risk of methodological post-truth is a pervasive challenge in global archaeology. In an era of increasing specialization, there is a tendency to transform successful experimental replications into normative prescriptions or general technological laws. Often, overlooking the inherent equifinality and variability of the global archaeological record threatens the interpretative rigor of the discipline at large.

A persistent issue in experimental archaeology lies not in experimentation itself, but in the relationship established between experimental models and archaeological variability. Replicative experiments necessarily rely on selected archaeological specimens as references; however, when these models are drawn primarily from exceptional, highly symmetrical, or technically refined artifacts, experimental outcomes tend to document specific technological solutions while underrepresenting the broader spectrum of variability present in the archaeological record. In such cases, variability risks being implicitly treated as deviation from an assumed norm rather than as a constitutive feature of past technological systems.

This problem becomes especially evident when experimental results are presented as archaeological and experimental evidence of generalized manufacturing practices. As previously argued in relation to experimental archaeology and post-truth (Nami, 2018), technically coherent and empirically informed interpretations may nevertheless rest on partial empirical foundations, giving rise to a form of methodological post-truth. Here, post-truth is used strictly in a methodological and epistemological sense, without reference to political, social, or public-discourse usages of the term. Post-truth does not imply fabrication or methodological error, but rather the uncritical extension of experimentally plausible scenarios beyond their legitimate inferential scope, transforming particular technological pathways into normative interpretive frameworks.

Recent experimental studies on the replication of fishtail projectile points provide a useful context for revisiting these issues. While such studies have contributed valuable insights into the production of highly refined bifacial specimens, they also illustrate the risks involved in generalizing from selective archaeological samples to technologically diverse repertoires. The extensive variability documented among Fell points suggests the coexistence of multiple technical trajectories rather than the repeated application of a single operational model. The aim of

this paper is therefore not to challenge experimental archaeology as a methodological practice, but to critically examine the inferential steps through which experimental results are transformed into generalized archaeological interpretations.

2. Experimental Archaeology and Technological Variability

Experimental archaeology provides an effective framework for engaging directly with material constraints and technical procedures involved in lithic production. By exploring how specific configurations may be achieved under controlled conditions, experimentation refines our understanding of technological possibilities (Coles, 1979; Callahan, 1979, 1981; Mathieu, 2002). Its interpretive value, however, depends on its explicit integration with archaeological variability.

Technological variability should not be regarded as residual or secondary. In lithic assemblages, variability emerges from the interaction of multiple factors, including raw material properties, blank size, technical choices, energy investment, functional requirements, and histories of use, maintenance, and resharpening (Nelson, 1991; Bleed, 2001). Experimental designs that privilege a narrow subset of artifacts—often those that are larger, more symmetrical, or more carefully finished—risk foregrounding a limited segment of this continuum while marginalizing alternative, equally viable technical solutions. This focus on optimization often overlooks the fact that technological choices in the past were frequently governed by “satisficing” rather than “optimizing” (Simon, 1956; Horsfall, 1987), where the goal was a functional tool rather than an idealized form. In lithic terms, this is evident when an artisan accepts a functional tool with asymmetrical edges or a step fracture, provided the tool meets immediate performance requirements. This perspective is consistent with long-standing empirical observations on lithic variability (e.g., Nami, 2003, 2010) and aligns with recent efforts to formalize experimental archaeology as a hypothesis-driven subdiscipline (Eren et al., 2016; Marreiros et al., 2020). While these authors emphasize the importance of validation and falsification to achieve methodological rigor, a risk of normativity remains if the “validated model” is implicitly promoted as the only legitimate explanation for the archaeological record.

It should therefore be stated explicitly that experimental archaeology does not provide proof of past technological practices, but rather explores technological possibilities under controlled conditions (Callahan, 1981; Nami, 1991, 2010). As noted by Wylie (1985) in her critique of archaeological analogy, the strength of an inference depends on the relevance of the attributes compared; experimental outcomes demonstrate technical feasibility but do not establish a point-to-point identity between modern replication and prehistoric reality. While replicative experiments—including those conducted by the author—successfully identify the technical parameters for producing pristine, “newly-made” specimens, they represent the starting point of an artifact’s experimental systemic context. The archaeological record, however, is dominated by the “messiness” of use-life variability within

past systemic contexts. Experimental outcomes do not demonstrate that a given sequence of actions was actually employed in the past; instead, they show that such sequences are technically feasible and compatible with known material constraints (Whittaker, 1994; Callahan, 1979). From this standpoint, experimental archaeology contributes by delimiting what could have been done, not by establishing what was done.

In this context, replicative experiments are best understood as heuristic tools rather than explanatory endpoints. They clarify technical constraints and possibilities, but do not, by themselves, establish the prevalence or normative status of specific procedures. Here, explanatory endpoints are understood as the empirically grounded limits beyond which experimental inference ceases to add explanatory power. It should be acknowledged that all replicative experiments necessarily involve selection, including the choice of reference specimens, raw materials, and technical objectives; such selection, however, does not in itself imply normativity. In exploratory experimental frameworks—particularly in early or pioneering studies—replication aims to open a field of technically viable possibilities rather than to define standard production schemes. For example, experimental work on bifacial reduction shows that features such as progressive thinning, bilateral symmetry, and the regularization of biconvex cross-sections emerge as necessary consequences of the reduction process itself, regardless of raw material or specific cultural context (Nami, 1997, 2017). At this level, the explanation is sufficient.

Extending experimental inference beyond this point—by treating selected technical pathways as exhaustive or prescriptive—goes beyond the explanatory limits of experimentation and risks transforming provisional models into normative interpretive frameworks.

3. Replication, Normativity, and Methodological Post-Truth

Against this background, replicative experimentation occupies a central place in experimental archaeology, particularly in lithic studies, but its interpretive power depends on maintaining a clear distinction between exploratory feasibility and normative inference. Problems arise, however, when experimental plausibility is conflated with archaeological generalization.

Beyond these limits, experimental results may retain technical coherence but lose their inferential validity when extended to generalized or normative interpretations.

Recent experimental work on fishtail projectile points illustrates this issue clearly. These studies provide important insights into the production of highly refined bifacial forms and clarify the technical requirements involved in achieving specific morphologies. At the same time, their experimental frameworks rely primarily on selective archaeological samples, emphasizing large, symmetrical, and carefully finished specimens. As a result, the technical pathways explored represent only a restricted subset of the broader technological variability documented

among Fell points.

This focus on ‘ideal’ specimens contrasts with the extensive techno-morphological variability documented in the South American record, where Fell points exhibit a true continuum of forms. This variability includes a wide range of body morphologies—from notably broad blades to narrow, lanceolate forms—as well as highly diverse shoulder treatments, ranging from rounded and straight to acute or barbed. Furthermore, variability in stem shapes as well as base preparation shows significant technical breadth, including fluted specimens, bases finished with deep and invasive pressure flaking, and others with short, marginal retouch. Such diversity reflects intentional design variations in finished products rather than mere ‘noise’ or accidents of manufacture, and/or resharpening end-products (Nami, 2021, 2026).

In this paper, variability is understood strictly in techno-morphological terms, referring to observable differences in lithic forms, reduction strategies, and technological outcomes. Variability is thus treated as an empirical property of lithic assemblages, expressed through differences in form, reduction intensity, symmetry, thinning strategies, and maintenance trajectories, rather than as deviation from an assumed technological norm. In this sense, the reduction sequence should be viewed as a flexible framework of problem-solving rather than a rigid “recipe” for production (Hayden, 1998). This assessment is grounded in the extensive archaeological record of Fell points across South America, which documents a wide range of techno-morphological configurations incompatible with a single normative production model.

From an epistemological perspective, the critical issue lies in the inferential step that links experimental feasibility to assumptions about generalized past practices. Replicative experiments demonstrate that certain techniques and procedures can produce particular outcomes, but they do not establish that such procedures were commonly or normatively employed. When this distinction is not maintained, experimental results may acquire an unwarranted evidentiary status, transforming plausible technical solutions into implicit standards against which archaeological variability is evaluated.

This is the context in which the notion of methodological post-truth becomes analytically relevant. Methodological post-truth must be distinguished from the standard concept of “sampling bias” or simple “over-generalization”. While the latter are methodological errors in research design, methodological post-truth is an epistemological phenomenon where the technical coherence and aesthetic success of a replication create a narrative so persuasive that it displaces the actual archaeological data. It arises when the “technical beauty” of a specific thinning sequence or tool application is mistakenly used as a substitute for archaeological evidence, transforming a particular technical pathway into a normative interpretive framework. Building upon its initial introduction into lithic studies (Nami, 2018), this paper further refines the concept by identifying the specific epistemological boundary where this phenomenon originates in experimental practice.

Following the epistemological warnings against the reification of models (Bunge, 1998), the methodological post-truth occurs when experimentally plausible technical solutions are retrospectively transformed into normative interpretive models, overshadowing the actual archaeological record.

In order to graphically clarify this conceptual reflection, **Figure 1** illustrates the epistemological tension between experimental outcomes and the archaeological record. The left side represents the inherent Archaeological Variability—a heterogeneous spectrum of technical solutions often governed by a “satisficing” logic (Simon, 1956; see also Horsfall, 1987)—while the right side shows a singular Experimental Replication as a normative model of Technological Possibility. The vertical axis, defined as the Explanatory Endpoint, marks the threshold of valid scientific inference. The diagram visualizes how Methodological Post-Truth arises when the specific results of a controlled experiment are forced across this boundary through an uncritical generalization, attempting to explain the multifaceted reality of the past through a single, idealized technical pathway.

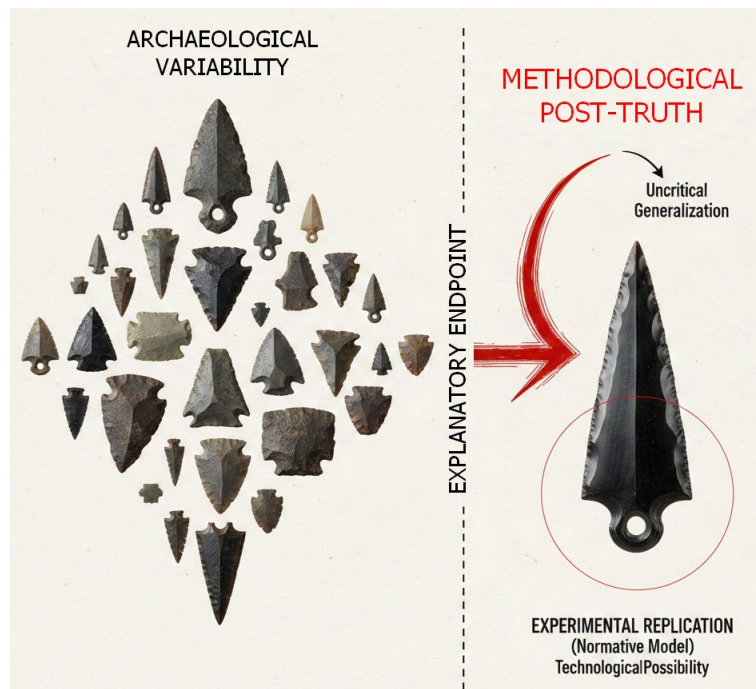


Figure 1. Epistemological framework of Methodological Post-Truth in experimental archaeology. The left side illustrates the inherent Archaeological Variability, represented as a heterogeneous spectrum of technical solutions often governed by a “satisficing” logic—where functionality takes precedence over formal perfection. In contrast, the right side displays a singular Experimental Replication acting as a normative model of Technological Possibility, typically focused on optimized or idealized forms. The vertical dashed line marks the Explanatory Endpoint, the limit of legitimate scientific inference. The red arrow denotes the transition into Methodological Post-Truth, occurring when the specific results of a controlled experiment are subject to an uncritical generalization, erroneously transforming a single technical pathway into a universal interpretive framework for the entire archaeological assemblage. (Note: Lithic figures are non-specific representations used for conceptual illustration)

This epistemological tension is empirically demonstrated in **Figure 2**. While the experimental “post-truth” often reifies large, symmetrical specimens as the only technological goal (Panel A), the archaeological record reveals a complex continuum of intentional designs (Panel B) and life-history variations (Panel C). The inclusion of lanceolate forms and heavily resharpened specimens highlights that the “ideal” form is merely one point in a long life-cycle governed by functional adequacy over formal perfection. In this sense, methodological post-truth occurs precisely when the “technical beauty” of such exceptional success is allowed to overshadow the multifaceted material evidence, erroneously transforming a specific technical possibility into a universal interpretive standard.

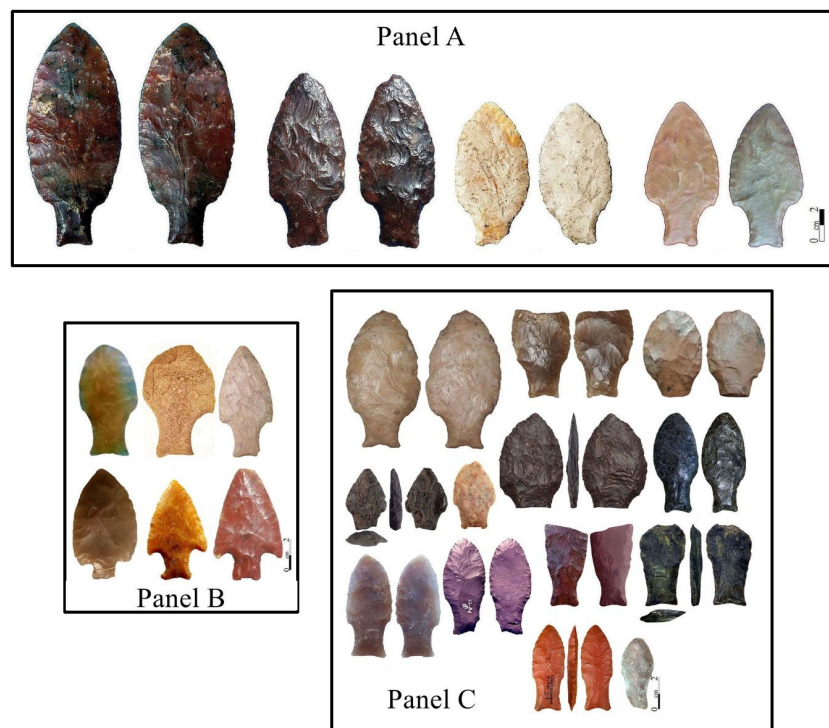


Figure 2. Empirical archaeological evidence of techno-morphological variability vs. normative experimental models. Panel A) Large, and highly symmetrical Fell points often selected as templates for normative replicative experiments. Panel B) Morphological continuum documented in the South American record, showing intentional variations in blade width and shoulder treatments in finished specimens. Panel C) Diverse life-history stages and functional variants, ranging from broad blades to lanceolate forms, including broken specimens with impact fractures. This spectrum demonstrates that formal “perfection” is an outlier rather than the technological norm.

Accordingly, experimental archaeology should not operate normatively, nor should experimental outcomes be treated as prescriptive models against which archaeological assemblages are measured. In this respect, the experimental definition of “how an artifact can be made” is methodologically comparable to normative archaeological definitions of techno-complexes based solely on a projectile point type: both risk reifying variability into normative categories if their inferential scope is not explicitly delimited.

4. General Principles, Technical Variability, and Non-Normative Knowledge

A key implication of this discussion is the need to distinguish clearly between general technological principles and normative production models. Lithic technologies operate within a limited set of shared principles—such as thickness management, control of platform angles, regulation of edge convexities, and maintenance of functional morphologies—while allowing for considerable flexibility in technical procedures and outcomes. These experimentally derived principles act as law-like (legaliform) constraints on technological processes, delimiting recurrent structural outcomes rather than prescribing normative forms. This pattern has been documented in diverse bifacial technologies where recurrent thinning strategies coexist with procedural flexibility (Callahan, 1979; Andrefsky, 1998; Whittaker, 1994; Nami, 2017). Technological knowledge (Schiffer & Skibo, 1987) in prehistoric contexts is therefore best understood as non-normative, structured around shared problem-solving strategies rather than fixed recipes.

The archaeological record of bifacial technologies, including fishtail projectile points, reflects this condition through the coexistence of diverse forms and production strategies that nonetheless conform to common technical constraints.

Experimental archaeology is particularly well suited to exploring such principles, provided that experiments are designed to address variability rather than to replicate idealized end products. When experimental efforts focus primarily on producing standardized or aesthetically refined artifacts, there is a risk of conflating principle-driven constraints with normative models of production, thereby obscuring the flexibility inherent in lithic technological systems.

5. Final Remarks

Experimental archaeology remains an indispensable component of archaeological research, but its contribution lies in exploring possibilities rather than providing proof. Its strength resides in clarifying what could have been done under specific material and technical conditions, not in demonstrating what was actually done.

Recognizing explanatory endpoints is therefore essential to preserving the interpretive integrity of experimental archaeology, ensuring that experimentally identified possibilities and principles are not retrospectively transformed into normative reconstructions of past technological practices—a concern repeatedly raised in methodological discussions of lithic technology (Nami, 1991, 2018). When experimental outcomes are treated as illustrative rather than prescriptive, they retain their full explanatory value without constraining archaeological interpretation.

By foregrounding technological variability and maintaining a clear distinction between general principles and normative models, experimental archaeology can avoid the production of methodological post-truths. A reflexive experimental framework—one that explicitly delimits the scope of its claims—offers a more robust basis for integrating experimental and archaeological data and for understanding prehistoric technologies as flexible, adaptive, and inherently variable systems.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- Andrefsky, W. (1998). *Lithics: Macroscopic Approaches to Analysis*. Cambridge University Press.
- Ascher, R. (1961). Analogy in Archaeological Interpretation. *Southwestern Journal of Anthropology*, 17, 317-325. <https://doi.org/10.1086/soutjanth.17.4.3628943>
- Bleed, P. (2001). Trees or Chains, Links or Branches: Conceptual Alternatives for Consideration of Stone Tool Production and Other Sequential Activities. *Journal of Archaeological Method and Theory*, 8, 101-127. <https://doi.org/10.1023/a:1009526016167>
- Bunge, M. (1998). *Philosophy of Science: From Problem to Theory*. Transaction Publishers.
- Callahan, E. (1979). The Basics of Biface Knapping. *Archaeology of Eastern North America*, 7, 1-180.
- Callahan, E. (1981). *Pamunkey Housebuilding: An Experimental Study of Late Woodland Construction Technology in the Powhatan Confederacy*. Ph.D. Thesis, Catholic University of America.
- Coles, J. (1979). *Experimental Archaeology*. Academic Press.
- Eren, M. I., & Meltzer, D. J. (2024). Controls, Conceits, and Aiming for Robust Inferences in Experimental Archaeology. *Journal of Archaeological Science: Reports*, 53, Article ID: 104411. <https://doi.org/10.1016/j.jasrep.2024.104411>
- Eren, M. I., Lycett, S. J., Patten, R. J., Buchanan, B., Pargeter, J., & O'Brien, M. J. (2016). Test, Model, and Method Validation: The Role of Experimental Stone Artifact Replication in Hypothesis-Driven Archaeology. *Ethnoarchaeology*, 8, 103-136. <https://doi.org/10.1080/19442890.2016.1213972>
- Hayden, B. (1998). Practical and Prestige Technologies: The Evolution of Material Systems. *Journal of Archaeological Method and Theory*, 5, 1-55. <https://doi.org/10.1007/bf02428415>
- Horsfall, G. (1987). Design Theory and Grinding Stones. In B. Hayden (Ed.), *Lithic Studies Among the Contemporary Highland Maya* (pp. 332-377). University of Arizona Press.
- Marreiros, J., Calandra, I., Gneisinger, W., Paixão, E., Pedergnana, A., & Schunk, L. (2020). Rethinking Use-Wear Analysis and Experimentation as Applied to the Study of Past Hominin Tool Use. *Journal of Paleolithic Archaeology*, 3, 475-502. <https://doi.org/10.1007/s41982-020-00058-1>
- Mathieu, J. R. (2002). *Experimental Archaeology*. BAR International Serie.
- Nami, H. G. (1991). Algunas reflexiones teóricas sobre arqueología y experimentación. *Shincal*, 3, 151-168.
- Nami, H. G. (1997). Investigaciones actualísticas para discutir aspectos técnicos de los cazadores-recolectores del tardiglacial: El problema Clovis-Cueva Fell. *Anales del Instituto de la Patagonia*, 25, 152-186.
- Nami, H. G. (2003). Experimentos para explorar la secuencia de reducción Fell de la Patagonia Austral. *Magallania*, 30, 107-138.
- Nami, H. G. (2010). Theoretical Reflections on Experimental Archaeology and Lithic Technology. In H. G. Nami (Ed.), *Experiments and Interpretation of Traditional Technologies: Essays in Honor of Errett Callahan* (pp. 91-168). Ediciones de Arqueología Contemporánea.

- Nami, H. G. (2011a). Reflexiones epistemológicas sobre Arqueología y tecnología lítica experimental. In A. Morgado, J. Baena Preysler, & D. García González (Eds.), *La investigación experimental aplicada a la arqueología* (pp. 37-43). Departamento de Prehistoria y Arqueología de la Universidad de Granada.
- Nami, H. G. (2011b). Fundamentos teóricos y epistemológicos sobre arqueología y tecnología lítica experimental. *Arqueología Rosarina Hoy*, 3, 75-98.
- Nami, H. G. (2017). Exploring the Manufacture of Bifacial Stone Tools from the Middle Rio Negro Basin, Uruguay: An Experimental Approach. *Ethnoarchaeology*, 9, 53-80. <https://doi.org/10.1080/19442890.2017.1286757>
- Nami, H. G. (2018). Theoretical and Epistemological Thoughts on Archaeology and Experimental Lithic Technology. *Journal of Research in Philosophy and History*, 1, 139-165. <https://doi.org/10.22158/jrph.v1n2p139>
- Nami, H. G. (2021). New Morpho-Technological Studies to Enhance the Knowledge of Fell Point Variability in Southeastern South America. *Journal of Archaeological Science: Reports*, 40, Article ID: 103205. <https://doi.org/10.1016/j.jasrep.2021.103205>
- Nami, H. G. (2022). La investigación actualística y experimental en los estudios líticos de Sudamérica. *Antrope*, 14, 57-121.
- Nami, H. G. (2024). Retrospectivas sobre tecnología lítica y arqueología experimental en Argentina. Resumen de la conferencia dictada en el II CAELA. *Cuadernos del Instituto Nacional de Antropología y Pensamiento Latinoamericano (Series Especiales)*, 11, 21-52.
- Nami, H. G. (2026). *Echoes of the First Americans: The Significance of Fell Points in the Peopling of the New World*.
- Nelson, M. C. (1991). The Study of Technological Organization. *Archaeological Method and Theory*, 3, 57-100.
- Schiffer, M. B., & Skibo, J. M. (1987). Theory and Experiment in the Study of Technological Change. *Current Anthropology*, 28, 595-622. <https://doi.org/10.1086/203601>
- Simon, H. A. (1956). Rational Choice and the Structure of the Environment. *Psychological Review*, 63, 129-138. <https://doi.org/10.1037/h0042769>
- Whittaker, J. C. (1994). *Flintknapping: Making and Understanding Stone Tools*. University of Texas Press.
- Wylie, A. (1985). The Reaction against Analogy. *Advances in Archaeological Method and Theory*, 8, 63-111. <https://doi.org/10.1016/b978-0-12-003108-5.50008-7>
- Wylie, A. (2002). *Thinking from Things: Essays in the Philosophy of Archaeology*. University of California Press.