Clovis Overshot Flaking, or Not?

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Introduction

Throughout the prehistory of the Americas, just as in the old world, many lithic flaking techniques were used in crafting stone tools and projectiles. This commentary focusses on what is commonly referred to as "overshot" flaking (or *outré passé* in the original French terminology). The definition of overshot used here is a flake that removes mass from a biface's edge opposite from the flake's origination. In some instances, overshot flaking can be identified on bifaces. All too often however, flake scars on bifaces are mis-interpreted, or at least inferred as overshot with no way to substantiate it conforms with this definition. Many of these bifaces exhibit evidence of thinning flakes that travelled across the face but terminated before the opposite edge of the biface (feathered termination). This is an important distinction when it comes to understanding many technologies, including Clovis biface reduction versus non-Clovis lithics. This also gets to the heart of the controversial question of intentionality of overshot flaking. Intentionality in turn, along with the implied repeatability, is required for the technique to be considered diagnostic of a technological lithic pattern used by a specific group of people. The discussion of overshot intentionality requires an examination of A) flake scars on bifaces and B) overshot flakes by themselves. Biface flake scars *may* help us to recognize differences between "full-face" or "across-the-face" flaking vs. overshot in some instances. Separately, actual overshot flakes help identify repeatable attributes indicating intentionality, as is observed with Clovis.

Background

The popular topic of overshot flaking gained public attention with highly visible publications purporting a connection between Upper Paleolithic European Solutreans and Clovis (Stanford et al. 2012). These claims are partly due to an interpreted commonality of observed overshot flaking technology. Other authors firmly believe there was no historical connection for myriad reasons. Some specifically state overshot flaking was not an intentional knapping technique at all, so this naturally cannot be used as evidence for a connection (Eren et al, 2013 and 2014). On the other hand, Stanford et al. (2012) and Frison et al. (1999) insist overshot flaking was an integral and standard part of Clovis knapping practices. Others have argued such flakes occur in greater numbers in Clovis assemblages than any other (Lassen 2018, p1). Eren et al. disagree citing "there is no regular, frequent occurrence of overshot evidence at Clovis sites" (2014 p.56). These differences in viewpoints (conclusions made on observable evidence and experimentation) have stirred many steadfast beliefs that are technically unproveable. This is especially in light of the "observable evidence" being subject to wildly varied definitions. These passionate convictions are difficult for the casual, but interested reader to sift through with all the confusing comparisons of what different people consider to be overshot flaking, or not. I.e. observations and conclusions are made based on biface evidence vs flake evidence, early-stage vs late-stage reduction, across-the-face vs overshot flaking, plunging failures vs feathered terminations and accidental overshot, etc.

These concepts (scientifically supported facts along with possible beliefs/opinions) introduced to a curious public have been consumed by a surprising audience of avocational and hobbyist knappers and historians with a keen interest. The debate over possible cultural or historical connections between Clovis people and Solutreans is far too tedious for this commentary however. The intentionality of overshot flaking (at least in the case of Clovis) ***is*** relevant and can be better appreciated once an understanding of its subtleties and apparent variations is established. A deeper look at flakes and bifaces separately is addressed here to gain insight into ***why*** certain flaking techniques were attempted. From the discussion here, three generalizations become clear:

A. A large percentage of overshot flakes were accidentally created i.e. the knapper failed.
B. A large percentage of what is popularly considered evidence for overshot on bifaces is not actually evidence of overshot at all.
C. Intentional overshot flaking was used for very specialized reasons and in some cases, is diagnostic of Clovis.

Lithic Concepts

Examples provided here include overshot flaking, as well as what many mistakenly consider to be overshot flaking. The intent is to explore these variations to better understand and recognize subtle differences of the general concept. The special case where overshot flakes were implemented to remove square-ish facets on opposite, or distal edges of a biface, is repeatable to the extent it must be assumed as intentional. Although there is no way to absolutely prove the intent of Clovis knappers, this conclusion is supported by innumerable and application-specific instances from across the continent. This is certainly the case in the Great Basin. It is evidenced in both bifaces and flakes. Unfortunately, general knapping techniques used to create overshot flakes (and general biface thinning) also resulted in frequent failures that might lead one to conclude they were not intentional. Believing the ancient knapper was infallible will lead to erroneous conclusions. Other examples of bifaces from other periods that show *apparent* overshot flakes are subtly ambiguous with Clovis bifaces. In general, they should be recognized as different although some specimens from the Western Stemmed series of projectiles and tools appear similar.

Occasionally, a flake that travelled across the entire width of a biface, is a product of Clovis flaking, but not necessarily an overshot. Nor is it (by itself) and indication of Clovis origins. On a finished biface, it is rare to see what the knapper intended in the case of intentionally removing opposite edges since that opposite edge no longer exists. Conversely, examining actual flakes in an assemblage or site, for evidence of overshot, yields much more insight into ***why*** the flake was removed, as the distal mass that was removed *does* remain. Three distinct types of flakes provide a basis for understanding the intended result, or what the knapper was trying to accomplish (or not). The following Figure 1 illustrates cross-sections of three biface/flake variations (adapted from Littlefield, 2015). In this figure, the blue shaded flakes in numbers 1 and 2 are technically overshots, while number 3 is a full-face, or across-the-face flake. In #1 an overshot plunged downward prematurely, destroying the biface and is considered an accident or an error. #2 is *potentially* an intentional and successful overshot. #3 is not an overshot according to the definition used here. The term "ultra-shot" is used by some authors to denote full-face flakes (Eren et al. 2013 p. 2938). The flake has a "feathered" termination. Viewed in isolation, one cannot discern if this flake travelled across the entire face.

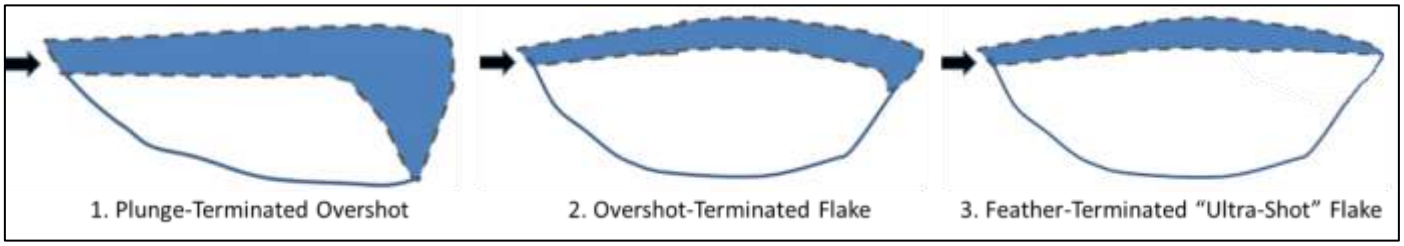

Figure 1 Overshot and Full-face Flakes

The distinct type of overshot flake of special interest here, is one that removed an unworked and roughly square portion of the opposite edge as illustrated in the top diagram in Figure 2. Flakes that are technically overshot due to the removal of distal-edge mass, but terminate at an angle significantly greater than, or less than 90° are much less likely to be intentional as knapping that edge directly would have been more efficient and less risky. This is certainly true in the middle image of Figure 2. The bottom image in Figure 2 could still be intentional depending on the shape and mass distribution of the biface. The existing bevel could have been used to thin the bottom face, but thinning that face may not have been desired.

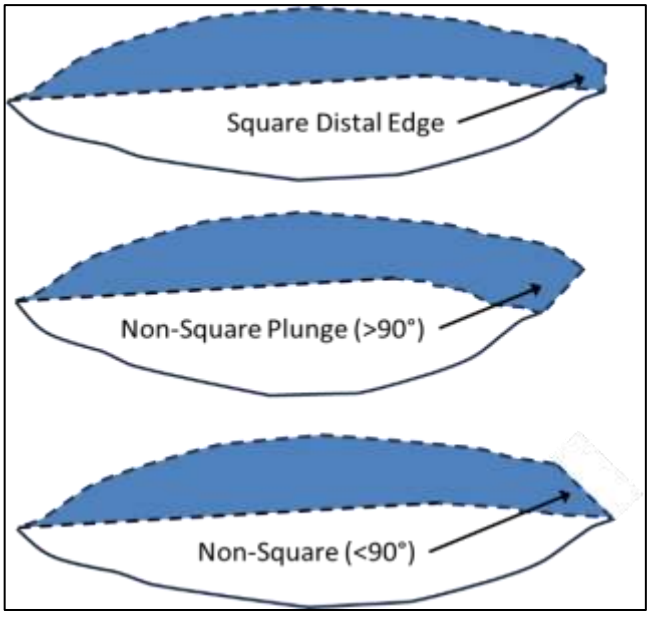

Figure 2 Types of Overshot Flakes

Analyzing actual flakes left behind is more informative than interpreting flake scars on worked bifaces because they typically retain the mass removed from the distal edge.

Looking at the bifaces (the non blue-shaded areas in Figure 2), it is difficult to tell how much mass, if any, was removed by the overshots. Nor is it possible to know the angle of mass-removal. It is therefore very difficult to definitively identify it as Clovis technology.

In the Great Basin, across-the-face flake scars on bifaces, in all its forms and varieties, is seen almost exclusively on Paleoindian projectiles, where percussion flaking technologies dominated. In rare instances when it is seen in archaic artifacts, it is safe to interpret those cases as mistakes. On some archaic artifacts from other regions, similar "across-the-face" biface flake scars occur but are most likely flake scars from earlier stages of biface reduction. This is supported by the fact that overshot flakes that include opposite edge mass-removal are almost never seen in these archaic sites. The following sections explore many cases related to overshot flaking including:

1. Plunging Overshot Failures on Bifaces
2. Plunging Overshot Failure Flakes
3. Successful Overshot Flake Scars on Clovis Bifaces
4. Clovis Overshot Flake Scars on Bifaces that Removed Square Sections of Opposite Edges
5. Clovis Overshot Flakes that Removed Opposite-Edge Mass
6. Possible Overshots and Full-Face Thinning Flake Scars on Paleolithic Western Stemmed Bifaces
7. Great Basin Paleo Use of Overshot as a Resharpening Technique
8. Full-Face Flake Scars on Archaic Bifaces

Bifacial Plunge Failures

Technically an overshot is when a portion of the distal edge of the biface is removed. Plunge failures happen when the mass removed is much greater than intended, typically ruining the biface. This is best highlighted with Clovis fluting attempts that plunged and destroyed the pre-form. Figure 3 below shows a preform from the Gault site in Texas on the left (from Littlefield 2015, p.62) and two similar basal fragments from a separate undocumented Clovis site in Central Texas on the right.

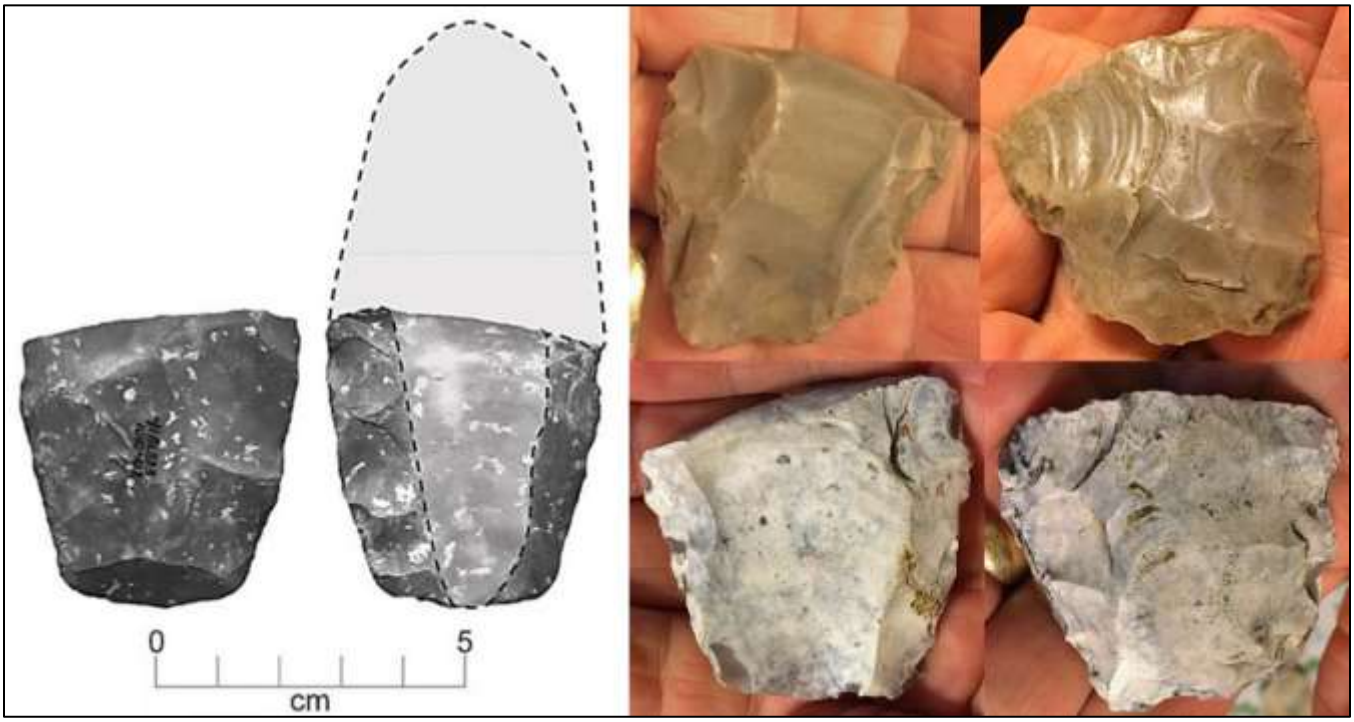

Figure 3 Plunge-failed Clovis Biface Preforms

Biface-Thinning Plunge Failure Flakes

The counterpart to the plunge-failure biface is the overshot thinning flake that plunged. Figure 4 below is a diagram of a bifacial reduction flake that plunged prematurely (possibly wasn't intended to over-shoot at all) and destroyed the biface (from Littlefield 2015, p.63)

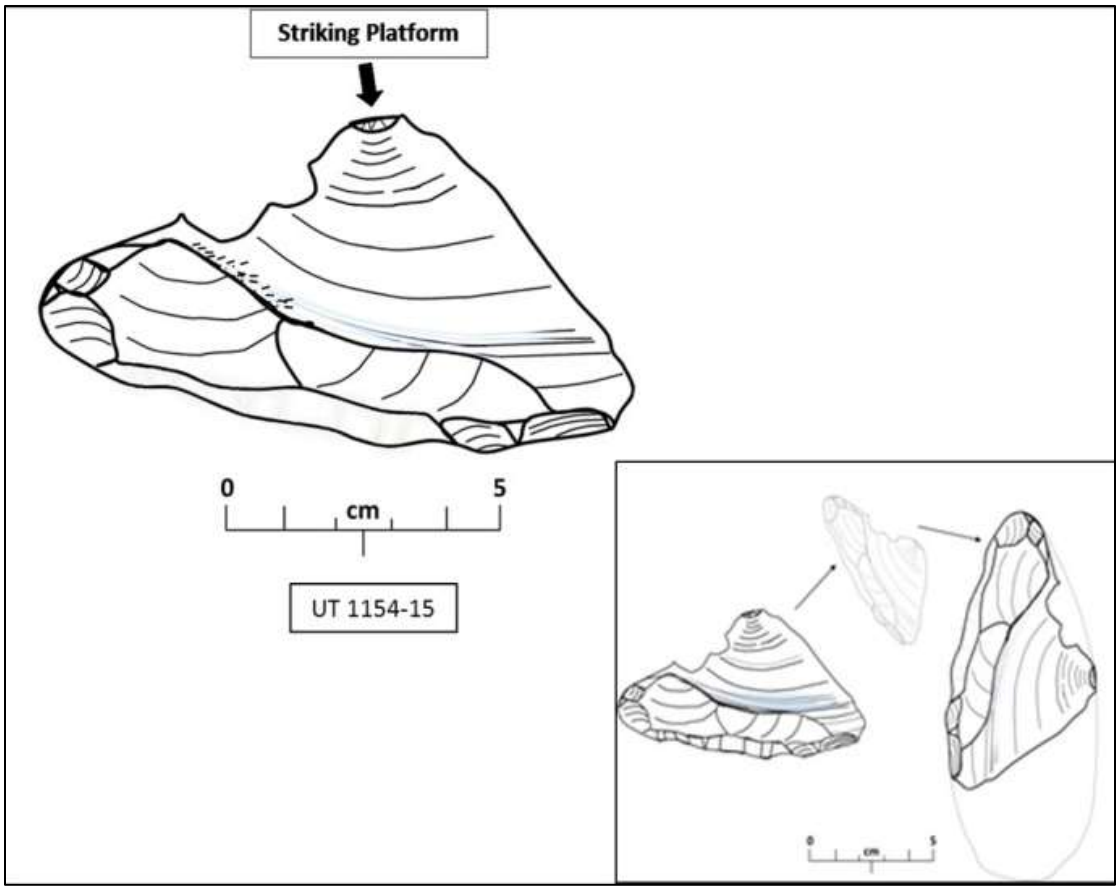

Figure 4 Plunge-failed Clovis Overshot Flake

Great Basin examples of plunge failure flakes are presented here in Figures 5 & 6. These obsidian versions are associated with Paleoindian sites in the Great Basin. These examples not only exhibit the overshot plunge failure; it is also clear the knapper was not trying to remove a square or problematic opposite edge. In each one, the opposite edge that was removed is not close to square, or 90° relative to the direction of the flake's propagation.

Figure 5 Plunge-failed Obsidian Clovis Overshot Flake

Figure 6 Plunge-failed Obsidian Paleo Overshot Flake

Figure 7 shows a small Great Basin paleo point. This is from a basal thinning attempt on a Western Stemmed paleo point that plunged disastrously. Technically this would be an example of an unintended overshot flake.

Figure 7 Western Stemmed Plunging Failure

Successful Overshot Flake Scars on Clovis Bifaces

Bradley et al. point out, Clovis knappers used careful overshot flaking throughout every stage of production (2010 p. 71). This is illustrated in the following figures. Although the Gault point in Figure 8 below (from Littlefield 2015, p.50) appears to be an example of full-face flaking, the relative dimensions and expanding nature of the flake suggests it was likely an overshot thinning flake from a previous, but still late-stage flake. In Figure 9, a small obsidian Clovis biface from the Great Basin reveals a variety of Clovis characteristics. The base is a slightly beveled, roughly square edge that remained from a previous break. Several attempts at end-thinning were made. The opposite face on the right includes a prominent overshot thinning flake that clearly removed mass from its opposite edge. This artifact appears to have been discarded. The knapper most likely gave up and decided it was no longer viable.

Figure 8 Gault Clovis Point

Figure 9 Obsidian Great Basin Clovis Point with Large Overshot

The proximal base of a large obsidian early-stage Clovis biface in Figure 10 reveals two, and possibly three flakes indicated by the arrows that overshot the biface before the fluting. The flakes clearly "plunged" to remove mass from the opposite edge.

The well-worn but complete Clovis point in Figure 11 (next page) depicts one face twice to highlight a distinctive flake that appears to be an intentional overshot flake implemented to thin the biface across its entire width. The point has been resharpened / rejuvenated but the overshot flake was done on the original biface, most likely in a fairly late stage of manufacture. The distal end of the overshot flake expands as it reaches the opposite face indicating it likely removed mass from the edge.

Figure 10 Obsidian Great Basin Clovis Preform Including Multiple Overshot

Figure 11 Obsidian Great Basin Clovis Point with Prominent Overshot Thinning

Clovis Overshot Flakes on Bifaces (Square Edge Removal) – A Case for Intentionality

Overshot flaking has been consistently observed on Clovis bifaces. Frequently the Clovis knapper clearly attempted to remove a section of the opposite edge that was square or perpendicular to the plane of the biface. These square edges were common in large blanks that were broken, or in some cases had unwanted cortex. Figure 12 illustrates a Clovis Biface section from the Gault site with multiple overshot attempts to remove a square edge (from Bradley et al. 2010 p. 69).

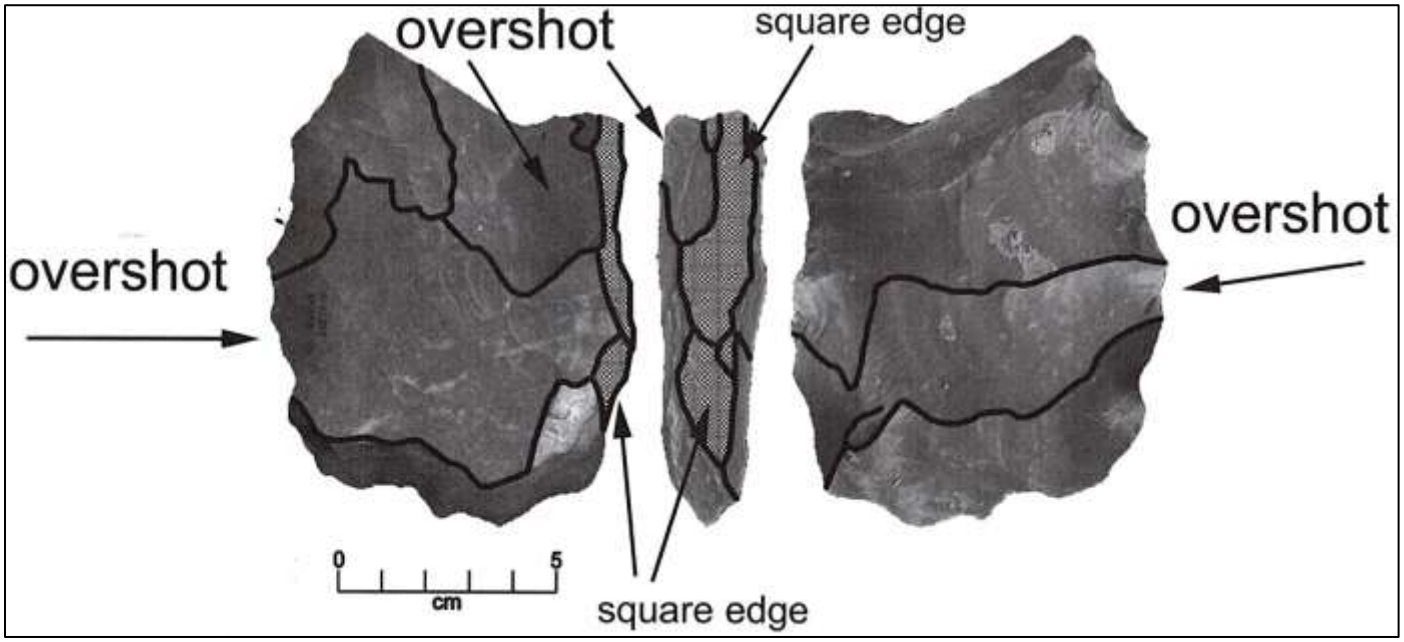

Figure 12 Gault Clovis Biface with Square Edge and Overshot Removals

Figure 13 below illustrates four Clovis point blanks or preforms from the Anzick Clovis Site in Montana (from Wilke et al. 1991 p. 252-254). All of these indicate overshot flaking that was performed to remove square edge facets as indicated by the parentheses.

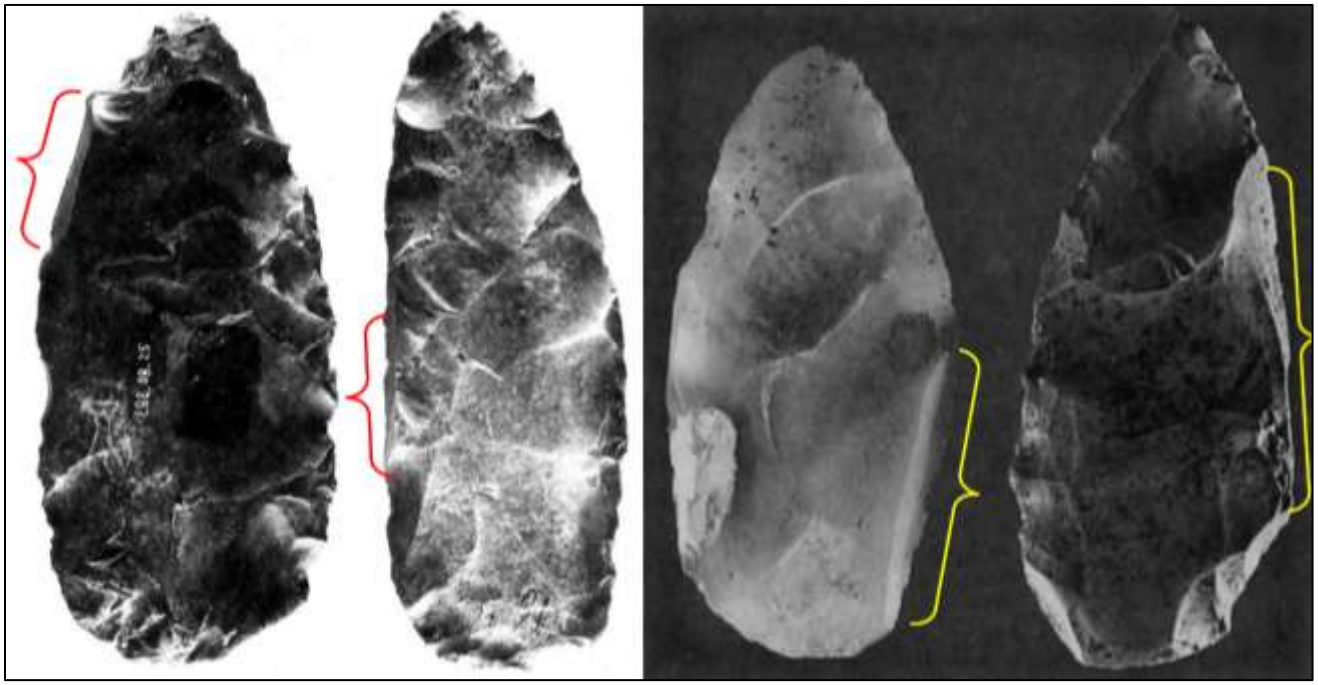

Figure 13 Four Anzick Site Clovis Bifaces with Square Edges

Figure 14 shows another Gault Site Clovis biface with remnants of cortex on the lower edge that was partially removed via overshot flaking.

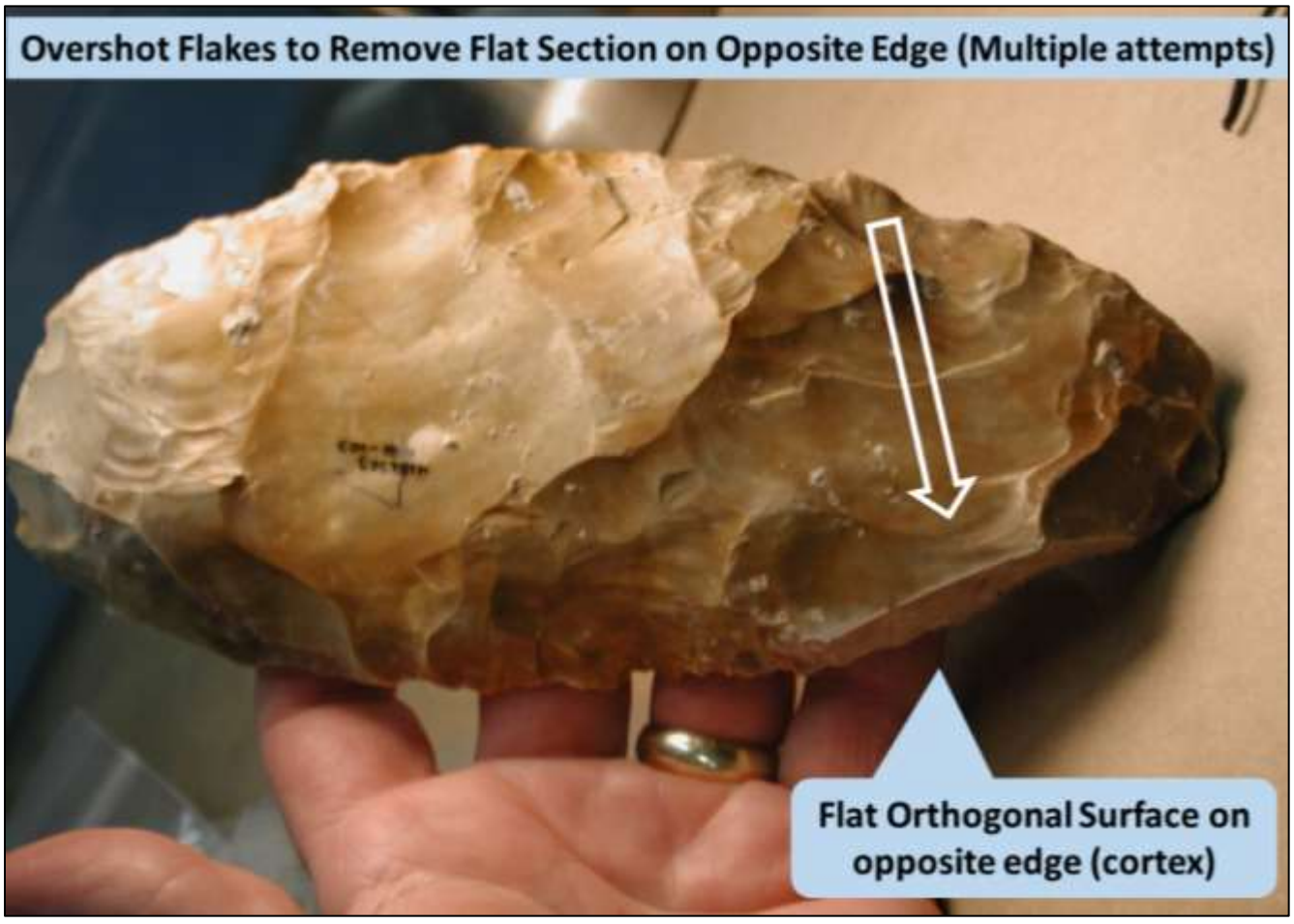

Figure 14 Gault Clovis Biface with Square Cortical Edge and Overshot Removals

Figure 15 depicts an additional Texas Clovis biface, from an undocumented site with prominent overshot edge-removal attempts.

Figure 15 Central Texas Clovis Biface with Square Edges and Overshot Removals

Many similar examples from the Fenn Clovis Cache demonstrate this exact flaking technology with cases where a portion of the square opposite edge still remains, with obvious attempts to remove them with overshot flakes. Figures 16 – 18 are from the Fenn Cache (Frison & Bradley, 1999. # 101 p.72, #104 p.92 and #110 p.75).

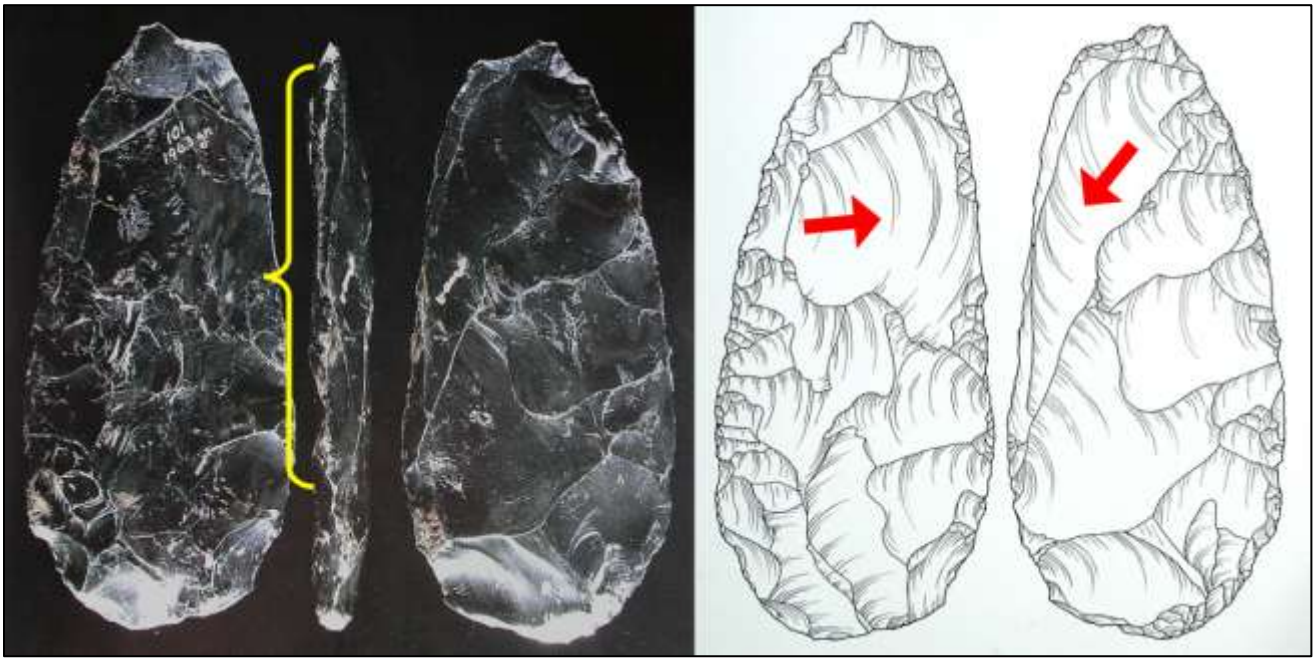

Figure 16 Obsidian Clovis Biface from the Fenn Cache (#101): Square Edges with Overshot Removals

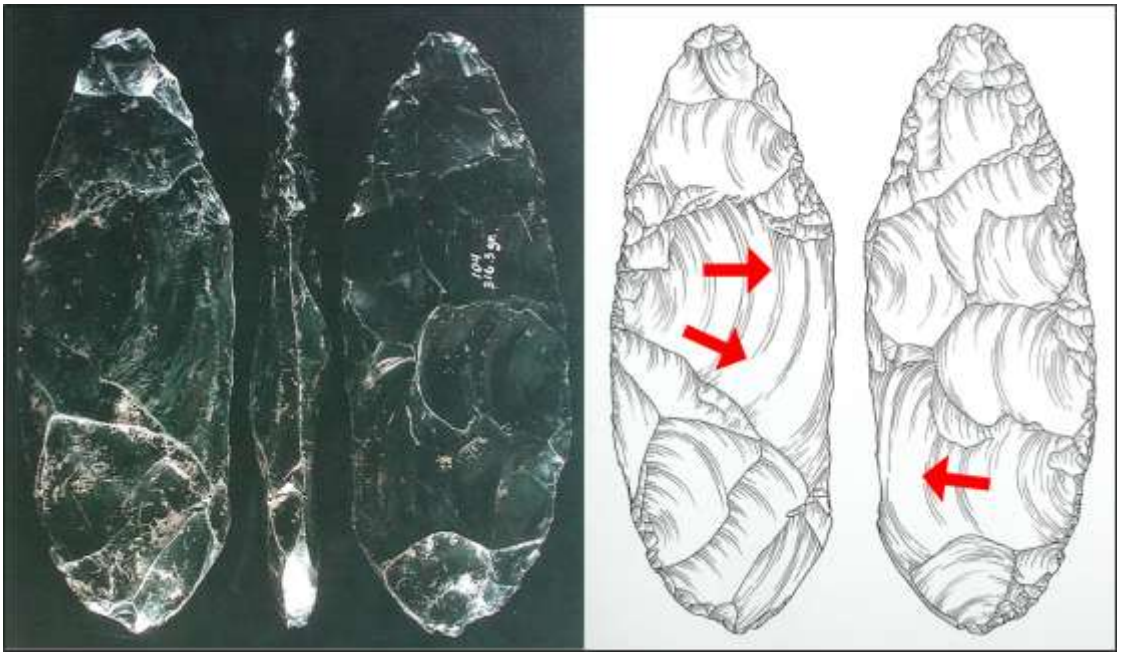

Figure 17 Obsidian Clovis Biface from the Fenn Cache (#104): Square Edges with Overshot Removals

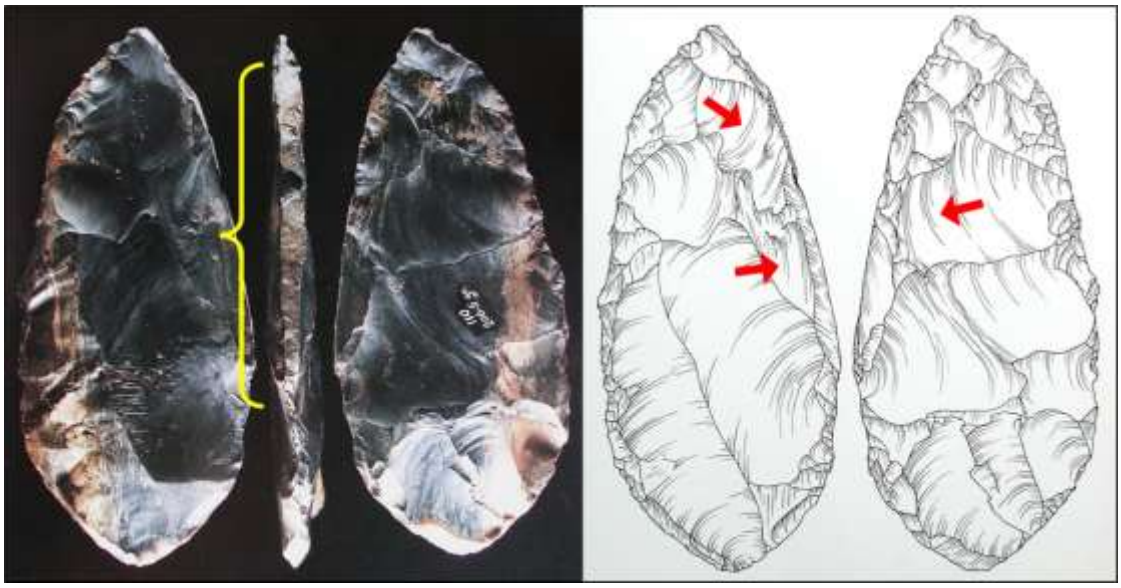

Figure 18 Chert Clovis Biface from the Fenn Cache (#110): Square Edges with Overshot Removals

One strong candidate from the Great Basin for an early-stage Clovis biface, made from obsidian, is included in Figure 19 here to the right. Attempts to remove a square section of cortex were made from both faces using overshot flaking.

Figure 19 Obsidian Biface from the Great Basin Cortical Edge and Overshot Removals

Examples of Clovis Overshot Flakes

Intentional Clovis overshot flakes removed square-ish or problematic (sometimes cortex) portion of a biface's opposite edge. This is a critical element that is associated with Clovis. Figure 20 below is a drawing from Bradley et al. 2010, p.77. It describes a Clovis overshot flake that removed a section of cortex. Below that in Figure 21 are two actual overshot flakes from Gault (Bradley et al. 2010 p. 72).

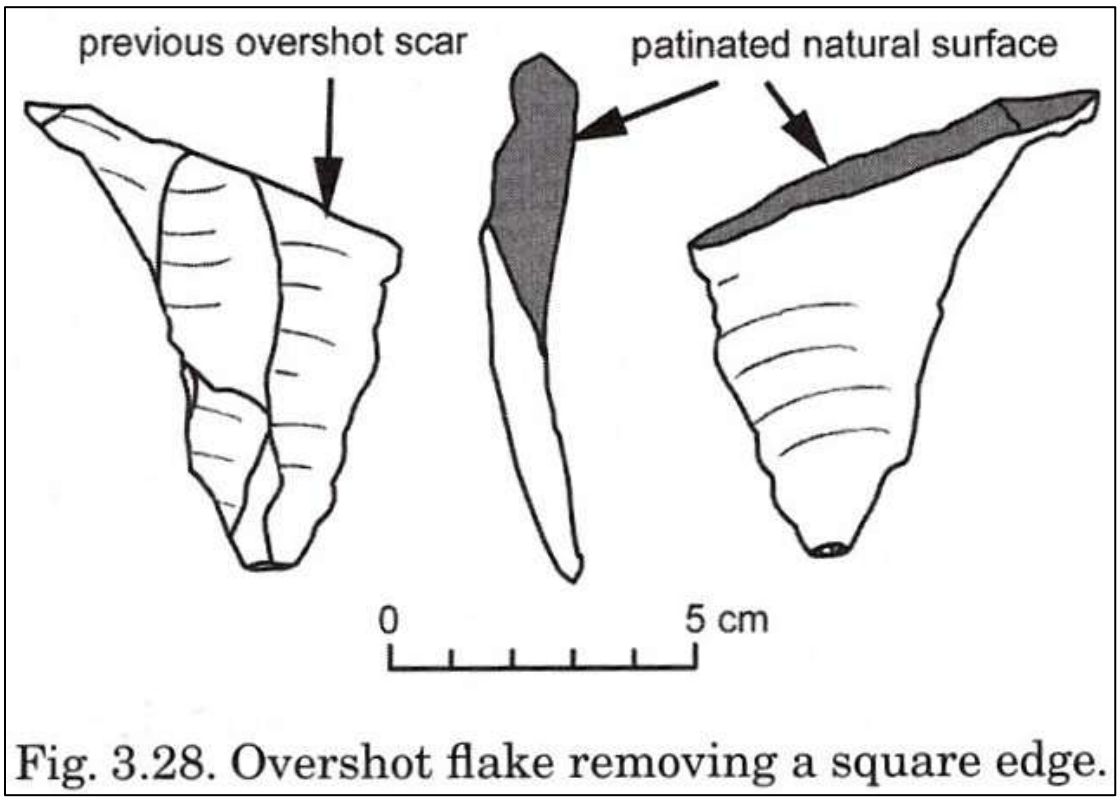

Figure 20 Overshot Flake Diagram from the Gault Clovis Site Showing Features, Including a Square Edge

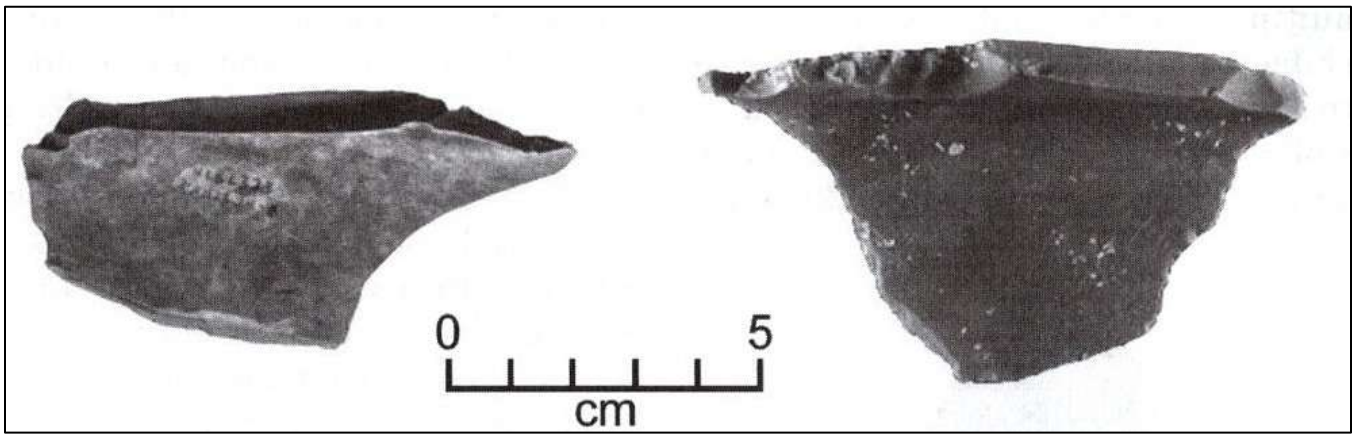

Figure 21 Overshot Flakes that Removed Square Edges, from the Gault Clovis Site

The obsidian overshot flake in Figure 22 (next page) is from a fluted point site in the central Great Basin. The flake reveals multiple attempts to remove portions of the square edge directly before the final overshot from the opposite edge successfully removed the square edge. This flake was X-ray sourced to Coso West Sugarloaf Mountain by The Northwest Research Obsidian Studies Lab (Nyers, 2025). Hydration measurement was made by Willamette Analytics (Henry, 2025). The hydration thickness was measured to be 20.7 µm. An age calculation using the equation below (from Rogers and Stevenson, 2022) with water concentrations and the rim correction factor for West Sugarloaf (WSL) indicate a possible age of 21,866 years. Most likely erroneous for a number of reasons, an ancient age is nevertheless indicated.

$$Age = \frac{1000 * (r * RCF)^2}{e^{[36.289 - \frac{(Q - 353.932 * w)}{T}]}}$$

Equation 1 Equation for Hydration-based Age

Where:

r – Hydration Thickness = 20.7 µm

RFC – Rim Correction Factor (0.967) to calibrate the location Effective Hydration Temperature to 20° C.

Q – Activation Energy in °K (10005.011)

w – Structural water content (obsidian-specific) = 0.62 for West Sugarloaf Mtn

T – Temperature in degrees Kelvin = 293.15°

Figure 22 Clovis Overshot Flake with Obsidian Sourcing and Hydration Analysis

Figure 23 depicts a similar obsidian overshot flake, found with the previous, but XRF-sourced to a very distant location. It too has a previous overshot flake scar on its dorsal face that did not completely remove the opposite edge, necessitating the subsequent attempt.

Figure 23 Obsidian Clovis Overshot Flake from the Great Basin

Figure 24 includes multiple views of a similar “compound” overshot flake where two attempts to remove the opposite edge were made resulting in a secondary overshot flake scar on the dorsal surface of the overshot flake.

Figure 24 Compound Clovis Overshot Flake from the Great Basin

Figure 25 below depicts a large overshot flake from the Gault Clovis assemblage along with a similar obsidian Great Basin version. The next Figure 26 includes the same Gault overshot refitted with a neighboring overshot flake that nicely depicts the sequence used by the Clovis knapper.

Figure 25 Large Overshot Flakes from Gault and the Great Basin

Figure 26 Two Large Overshot Refit Flakes from Gault

Overshot Flakes from the Great Basin

Most likely Clovis, the following images represent examples of overshot flakes that removed roughly square opposite edges. Cortex removal was clearly the intent on some.

Figure 27 Two Obsidian Overshot Flakes from the Great Basin, the Square Edge on “B” is Cortex

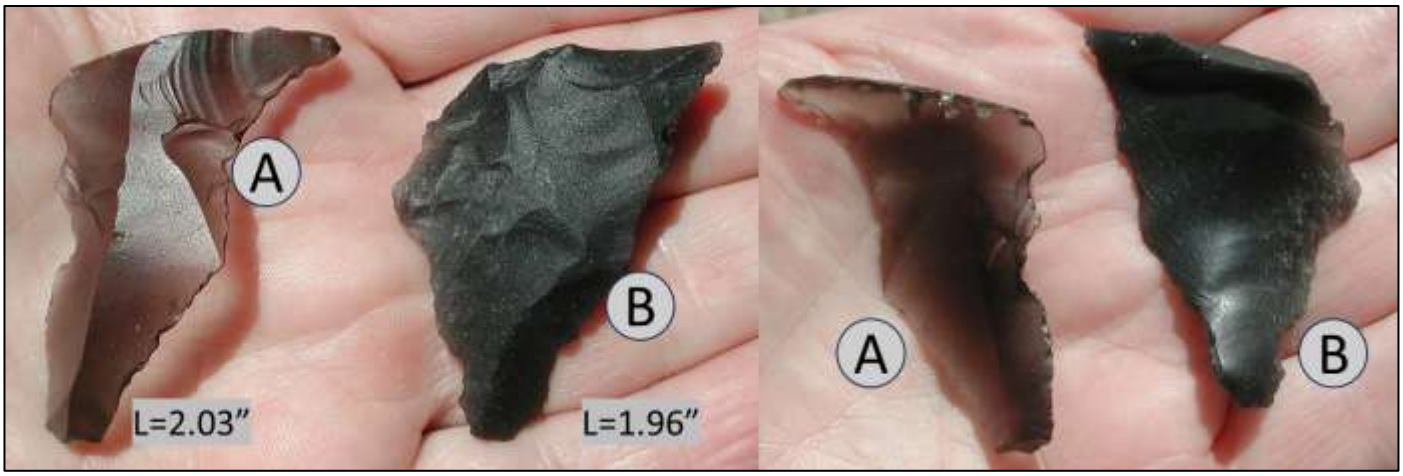

Figure 28 Two Obsidian Overshot Flakes from the Great Basin

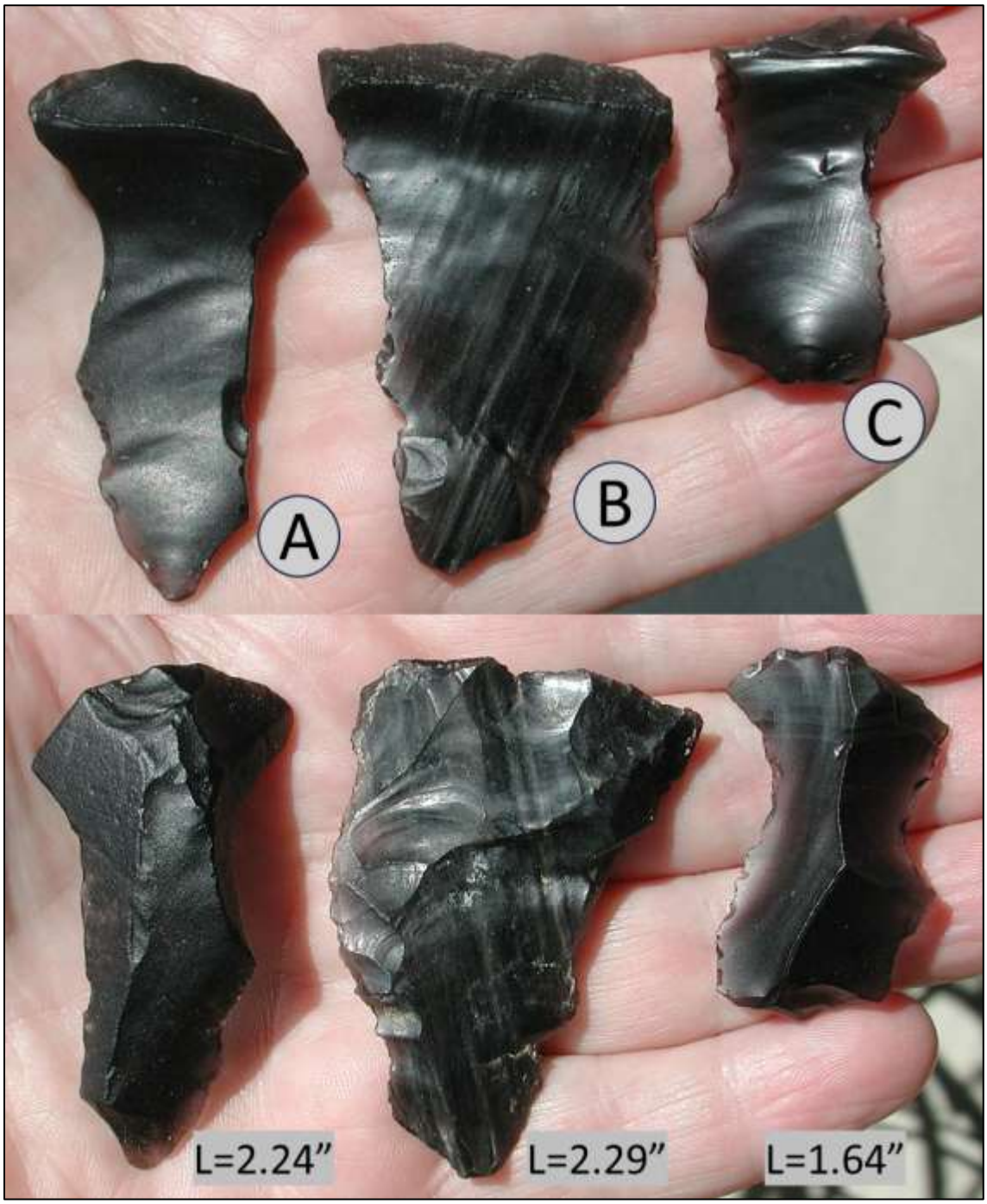

Figure 29 Three Obsidian Overshot Flakes from the Great Basin, the Square Edge on “B” is Cortex

Figure 30 Two Obsidian Overshot Flakes from the Great Basin

Figure 31 Two Non-Obsidian Overshot Flakes Found together in the Great Basin

Figure 32 Two Large Obsidian Overshot Flakes from the Great Basin, Left Image Shows Cortex, Platform Missing

Possible Overshots & Full-Face Flake Scars on Western Stemmed Bifaces

It is sometimes very difficult to distinguish possible early-stage biface thinning (across-the-face) flake scars from Clovis overshot flakes. The large WST biface illustrated here in Figure 33 (also described in Great Basin Multi-purpose Tool) shows several flakes that appear to be overshots. This artifact is a rare candidate for overshot flaking on a non-Clovis biface. At least two flakes on one face appear to expand as they reach the distal edge. Still most likely thinning flakes not intended to overshot, they speak to the flaking technology and how flakes, intended to travel the full face, actually do travel farther than intended. Although inconclusive, there is no obvious indication of intentional distal-edge mass removal although that cannot be eliminated. This may represent Clovis influences on the Paleo Western Stemmed Tradition technologies.

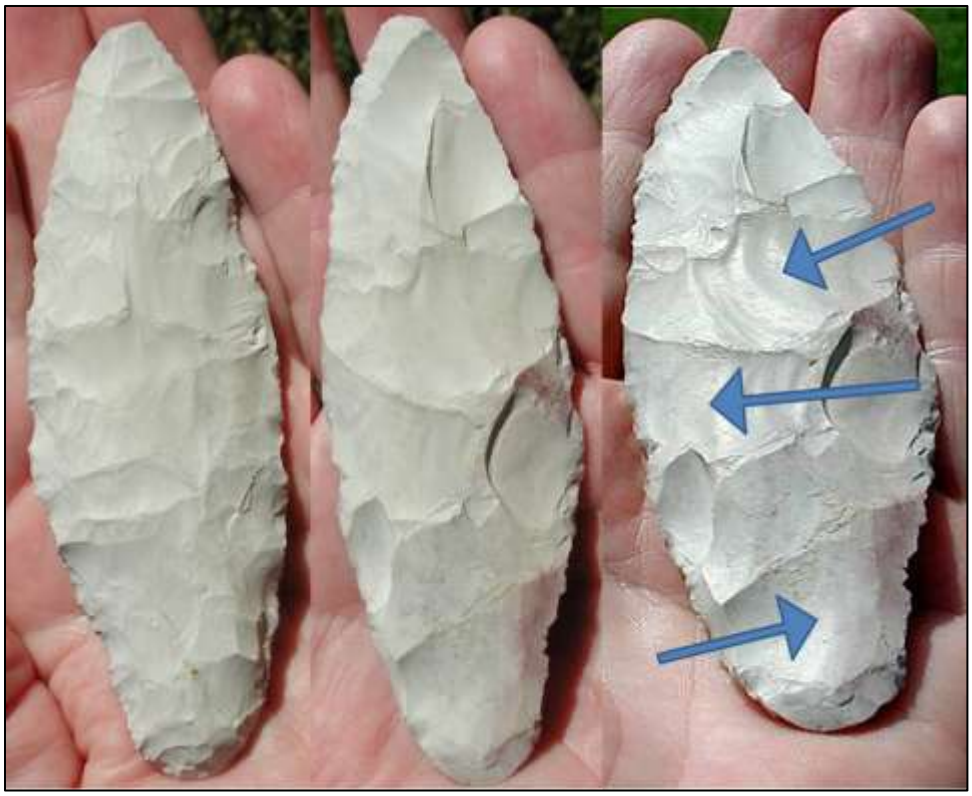

Figure 33 A Large WST Multi-purpose Tool with Possible Overshot Flaking

Figure 34 A WST (Parman) Point with Full-face Flaking

Figure 34 (left) is another WST point that also exhibits large percussion across-the-face thinning flakes similar to Clovis technology. These were most likely not intended to over-shoot the biface for the purpose of removing mass from the opposite edge however. Although none of the flakes actually appear to have traveled to the opposite edge, several did traverse most of the full width resulting in a very flat plano-plano cross-section.

Figure 35 shows a small Western Stemmed point with multiple full-face flakes including a prominent scar in the stem area. This is another occurrence of the use of full-face flakes to achieve a thin/flat biface as opposed to removing mass from an opposite margin. Figure 36 is another Western Stemmed (Lake Mojave) point with large flake scars. These are most likely remnants of bifacial thinning flakes from earlier stages of manufacture.

Figure 35 A Small WST Point with Full-face Flaking

Figure 36 A WST Point with Full-face Flaking

Overshot as a Resharpening Technique on a Western Stemmed Biface

Some researchers are convinced overshot flaking was a technique only used for initial biface shaping and thinning, but specifically not a "re-sharpening strategy" (Eren et al. 2011, p. 51). While this generalization seems intuitive, it appears to be incorrect for some Great Basin paleo points, particularly Haskett. Haskett technology is distinct from Clovis in that the stem is intentionally thick, presumably for mounting in a socket haft (see Baker Socketed Hafts). However, thinning the distal end for penetration appears to be a probable design element, even in resharpening. Figure 37 (right) highlights a Haskett point with resharpening flakes on both faces of the business-end that traveled completely across the biface. The two flakes meet each other on the opposite edge. Whether these flakes were intended to overshoot, or simply travel across the face and went too far is difficult to say. The subtle difference seems immaterial however as this is classified as overshot technology. Haskett knappers were clearly familiar with the techniques they were using.

Figure 37 Overshot Flaking as Resharpening on Haskett

Comparison to Full-face Flake Scars on Archaic Projectiles

A risk in trying to identify Clovis technology based on apparent overshot scars on bifaces alone is illustrated in Figure 38 below. The Gault Clovis point (also shown in Fig. 8 previously) is depicted next to two middle-archaic Pedernales points, also from central Texas. Whether the flake scars on these points indicate accidental, intentional across-the-face thinning flakes, or even remnants of earlier points re-worked by much later Indians is debatable. Overshot technology, as in the Clovis technique, is much easier to see in the flakes themselves rather than flake scars on bifaces.

Figure 38 Three Texas Artifacts: Left is a Gault Clovis Point, Center and Right are Archaic Pedernales Points with Full-face Flakes

Summary and Conclusions

Examining both flake scars on bifaces and the flakes created from lithic reduction in the same context is valuable in gaining insights into the technologies used and understanding the intents of the knappers. It is clear the knapping techniques used by Clovis Indians frequently created what we call overshot flakes. These flakes are almost always a combination of successful overshot flakes (as evidenced by square edge removals), failures (as evidenced by catastrophic plunges) and very early-stage cobble modifications (removal of cortex and other undesirable preform errors, stacks and material imperfections). Regardless, all these forms of overshot flaking are a “defining trait for Clovis” (Lohse, 2014 p. 50). Isolated examples found out of context are extremely rare and not sufficiently repeatable to consider them part of any other intentional technological or cultural pattern in North America.

On bifaces, although sometimes ambiguous, full or across-face flakes were created in later assemblages but were not overly common. Clearly not intended to remove mass from opposite edges, their intent was different. Biface thinning (without sacrificing width) and modifying opposite edges, serve completely different purposes. Some Paleoindian projectile and tool types from the Great Basin do exhibit rare indications of overshot, but it was also not prevalent. The best evidence for overshot on bifaces are flake scars that expand in width toward the opposite edge, which possibly indicates an act of removing opposite-edge mass similar to Clovis. This is also possible evidence of lingering influences left by Clovis Indians.

Summarizing facts about overshot flaking:

1. Successful Clovis overshot flakes intentionally removed mass from a biface's opposite edge (flat/square edge, cortex, or other problematic aspects) and are unique to Clovis in the Americas.
2. Many overshot reduction flakes are errors. The angle of the remaining distal biface edge should be roughly square (~90°). Otherwise correcting that mass is less problematic by non-overshot flaking techniques. Some obsidian specimens resulted in steeper angles, possibly due to material properties or difficulty in knapping. Overshot flakes with very high angles (as shown in figures 5-7 for example) are clearly unintentional as they destroyed the biface.
3. True Clovis overshot flaking is rarely possible to distinguish on a biface not identifiable as Clovis for other reasons. Fenn Cache examples are exceptions due to a) the very early stage of the biface where remnants of a square opposite edge are still visible and b) the cache itself established the artifacts as Clovis, removing any doubt.
4. Flake scars on bifaces must at least show expanding margins of the flake toward the distal edge to be considered possibly Clovis.
5. Full-face, or across-the-face flake scars on bifaces / projectiles do not solely indicate Clovis technology. Many clearly non-Clovis examples are seen from multiple time periods across the continent. These flakes could be intentional thinning flakes or accidental.
6. Some Paleoindians did implement overshot flakes in a resharpening sequence as in the case of Haskett (a Western Stemmed variant). The purpose of this appears to be attempts to thin the distal edge for penetration, while maintaining a thick stem presumably for hafting. This is subtly different from Clovis biface reduction overshot.

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