A synthesis of the Dibble et al. controlled experiments into the mechanics of lithic production

Supplementary Information 1

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This rMarkdown file contains the code that is used to produce some of the figures presented in the paper.

1 Figures

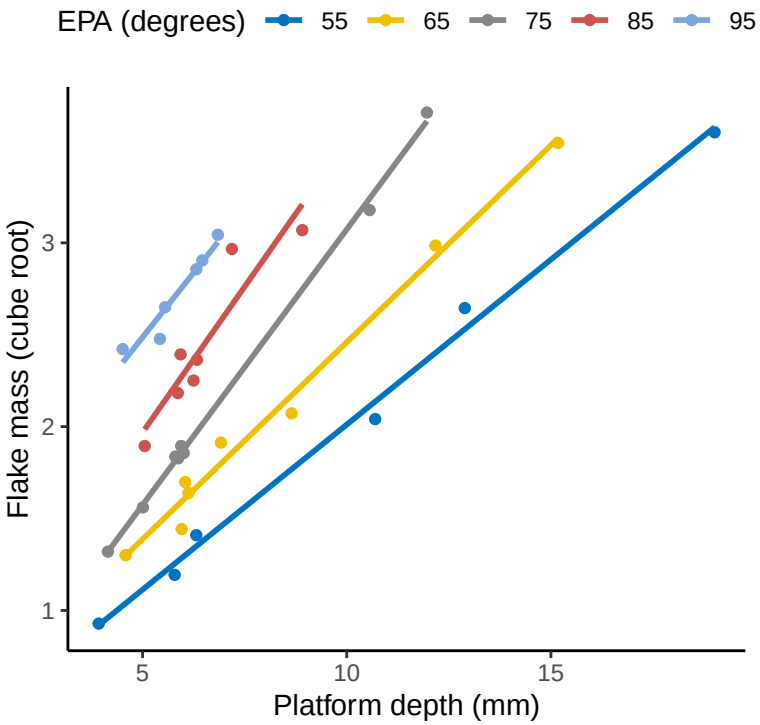

Figure 4. Relationship between platform depth and flake mass grouped by exterior platform angle. The cube root of flake mass is used here to standardize its dimension with platform depth (Dibble & Rezek, 2009)

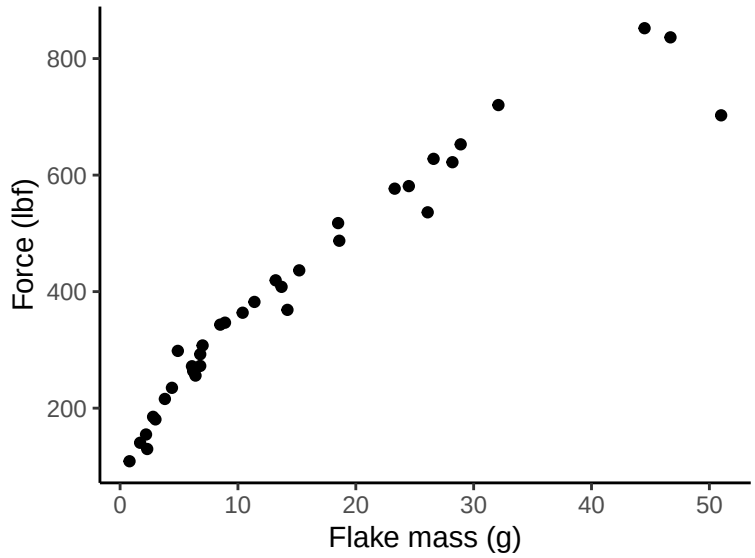

Figure 5. Relationship between flake mass and striking force, the minimum force required to remove a flake with a certain mass is tightly related to that mass (Dibble & Rezek, 2009). In this figure force is expressed as a function of the flake mass

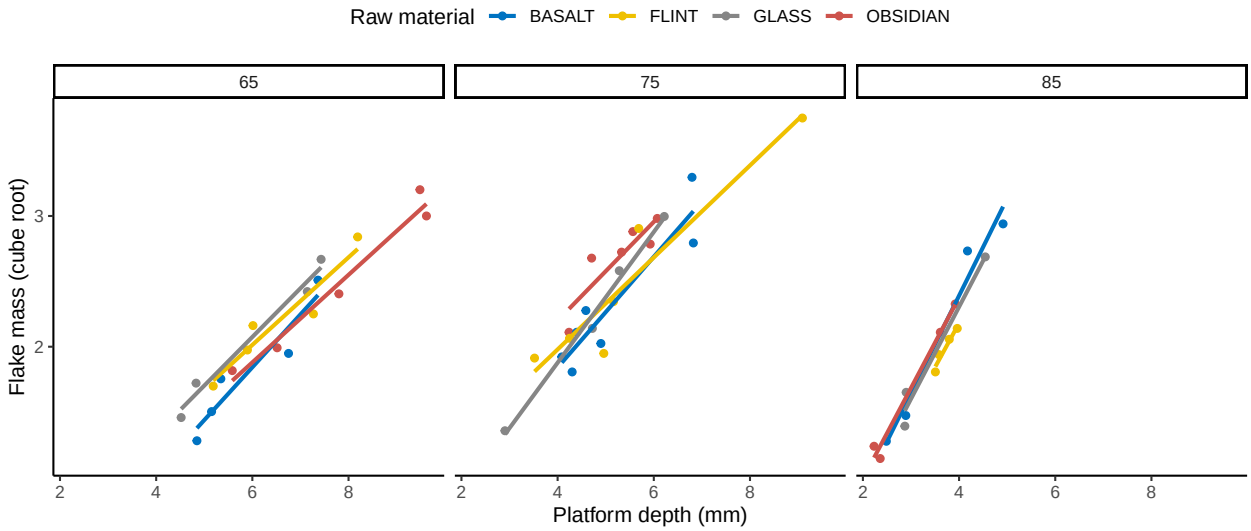

Figure 6. Relationship between platform depth and flake mass (cube root) of flakes made of four different types of raw material grouped by exterior platform angle (Dogandžić et al., 2020)

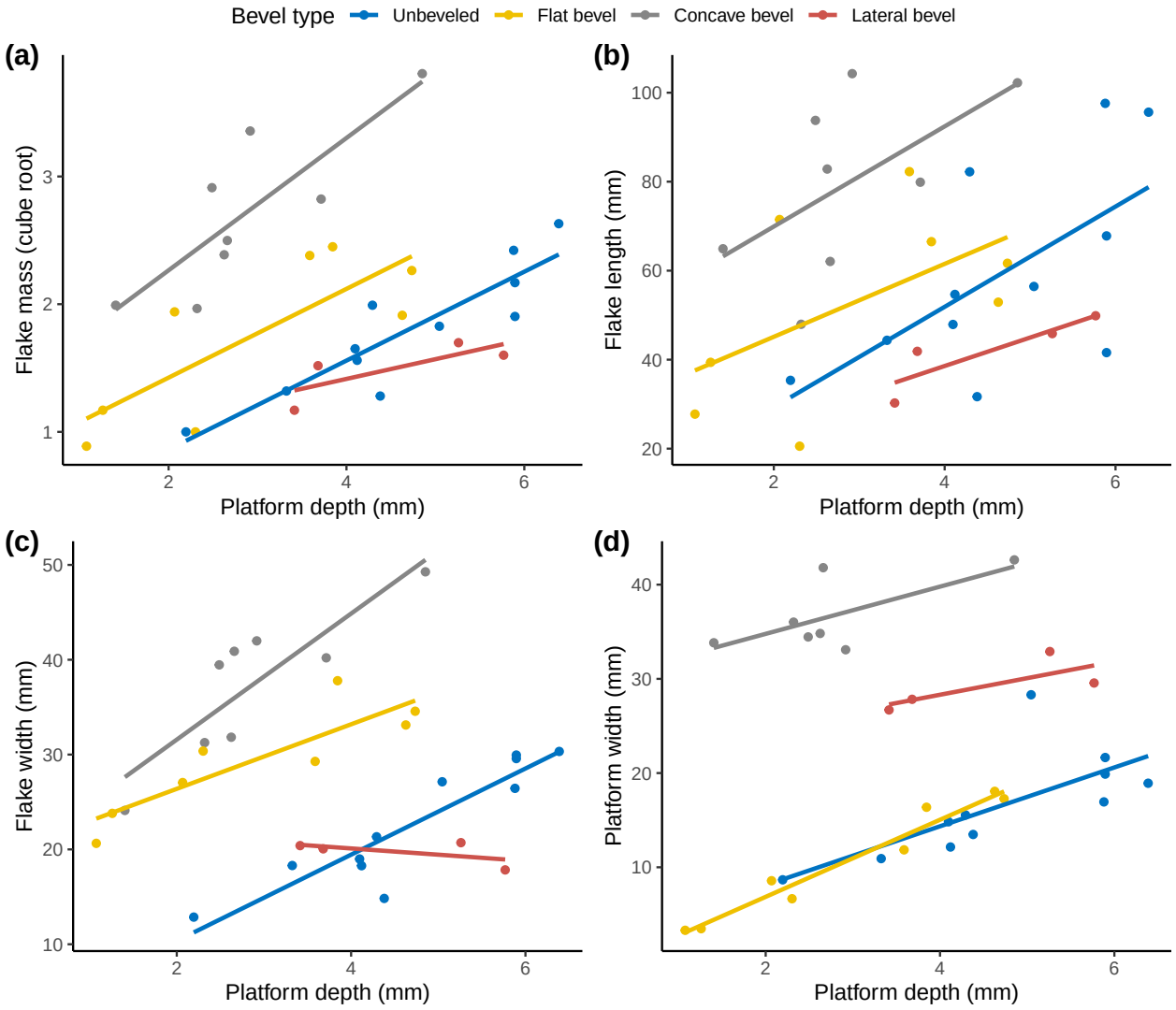

Figure 8. Relationships between different flake attributes and platform depth for beveled and unbeveled flakes (Leader et al. 2017). Both flat and concave bevels were cut at a 6 mm depth from the original flake exterior surface, and the lateral bevels were cut at 45° relative to the platform surface. a) shows the relationship between the cube root of flake mass and platform depth, b) shows the relationship between flake length and platform depth, c) shows the relationship between flake width and platform depth, and d) shows the relationship between platform width and platform depth

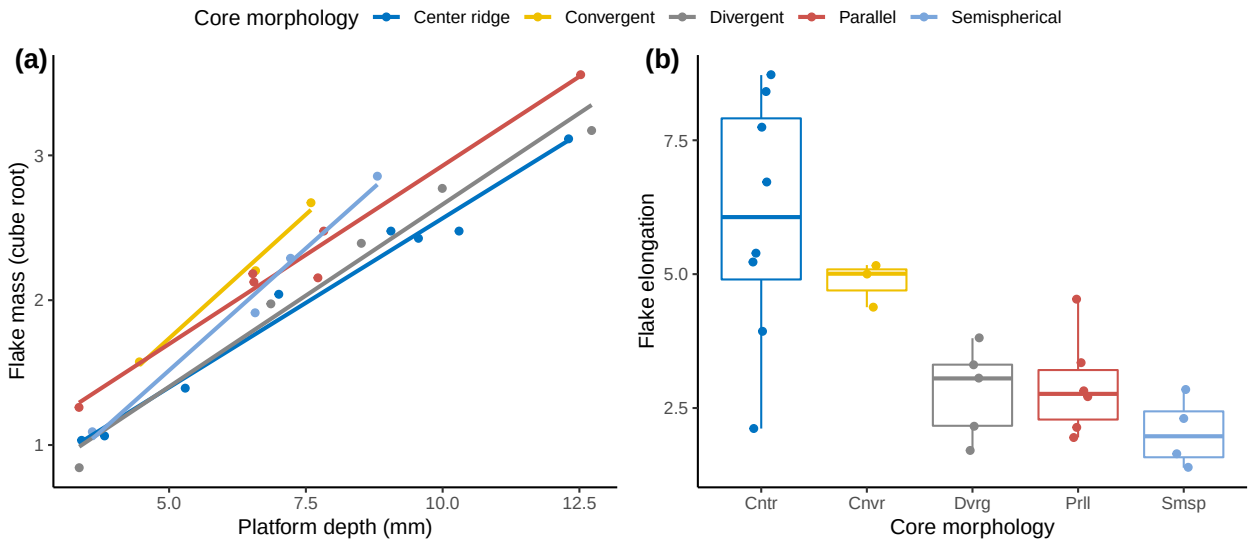

Figure 9. (a) The relationship between platform depth and flake mass for different core morphologies when exterior platform angle is 65°. (b) Flake elongation (length/width) grouped by the core morphology for different core morphologies (Rezek et al., 2011)

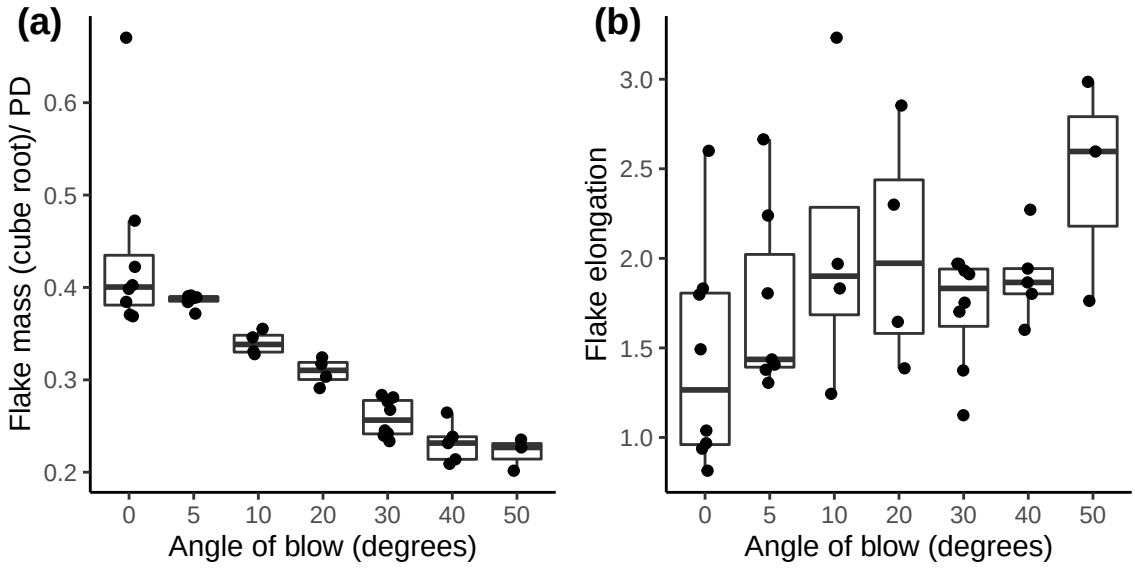

Figure 11. Box plots showing changes in flake mass and other dimensions on angles of blow ranging from 0° to 50°. (a) Flake mass (cube root) standardized by platform depth on flakes produced from angles of blow ranging from (b) Flake length relative to flake width. All flakes have an exterior platform angle of 65°

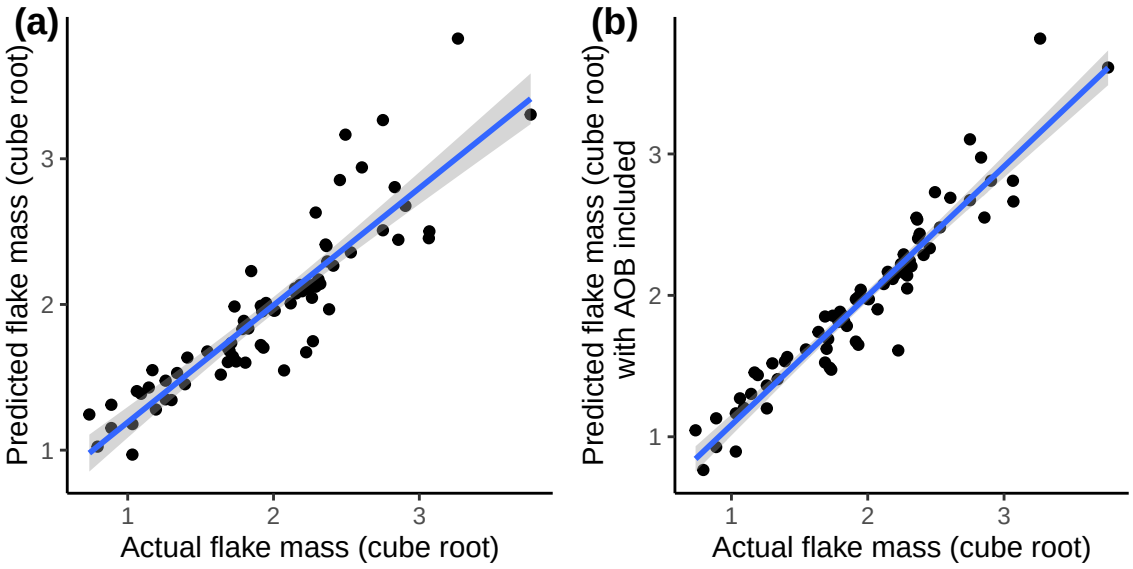

Figure 12. Predicted flake mass to actual flake mass. (a) The predicted flake mass is calculated from the basic EPA-PD model, (b) the predicted flake mass is calculated from the updated EPA-PD model with the addition of the angle of blow

2 Statistical Analysis

2.1 Platform lipping statistics

Summary of percentage of platform lipping on flakes made of different hammers.

Hammer material	Platform lipping	% Lipped
BONE50	50	98.04%
COPPER	35	56.45%
STEEL	20	33.90%

2.2 EPA-PD linear model

2.2.1 Summary statistics of the EPA-PD model:

```
Call:
lm(formula = flake_mass_cbrt ~ platthick * epa, data = lm_model)

Residuals:
     Min       1Q   Median       3Q      Max
-0.67207 -0.15750  0.02198  0.14393  0.61056

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   -0.020923   0.855880  -0.024    0.981
platthick      0.063811   0.117180   0.545    0.588
epa            0.010427   0.012545   0.831    0.409
platthick:epa  0.002140   0.001805   1.185    0.240

Residual standard error: 0.2774 on 72 degrees of freedom
Multiple R-squared:  0.8036,    Adjusted R-squared:  0.7954
F-statistic: 98.17 on 3 and 72 DF,  p-value: < 2.2e-16
```

2.2.2 Summary statistics of the EPA-PD-AOB model:

```
Call:
lm(formula = flake_mass_cbrt ~ platthick * epa + aob, data = lm_model)

Residuals:
     Min       1Q   Median       3Q      Max
-0.55112 -0.10528  0.01444  0.09568  0.61352
```

```
Coefficients:
               Estimate Std. Error t value Pr(>|t|)
(Intercept)   -0.400954   0.571987  -0.701   0.4856
platthick      0.087193   0.078160   1.116   0.2684
epa            0.017977   0.008401   2.140   0.0358 *
aob           -0.024644   0.002583  -9.539 2.39e-14 ***
platthick:epa  0.002634   0.001205   2.186   0.0321 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.185 on 71 degrees of freedom
Multiple R-squared:  0.9139,    Adjusted R-squared:  0.9091
F-statistic: 188.4 on 4 and 71 DF,  p-value: < 2.2e-16
```