

## Results Framework

### MUSARNA

by Laura Banducci

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#### A note to reader:

*These are the results from statistics tests run on data on ceramics from Musarna, Italy.*

*The data used can be located at [github.com/laurabanducci/foodways\\_republican\\_italy](https://github.com/laurabanducci/foodways_republican_italy) and all of the following calculations were completed in SPSS Version 21.*

*An explanation of the statistical tests and the decisions behind them can be found in the book [Foodways in Republican Italy \(2021\)](#) Appendix I. Interpretation of these results can be found in this publication.*

*When data was collected, the terms used for the orientation of linear wear was slightly different than at the time of the publication of the project. Thus, in the following notes:*

*parallel = concentric scratches*

*perpendicular = radial scratches*

*diagonal = chordal scratches*

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## ANALYSIS

### 1. ceramica da fuoco

-general discussion of the definition of the ware and the forms in which it appears

#### A. pentole

##### a. Morphology

##### i. general distribution of rim diameter

##### **ii. diameter comparison over time > is there a change?**

*More variability over time and generally larger size (median and mean) in Period 4 and 6*

##### **iii. wall thickness comparison over time > is there a change?**

*No*

##### **iv. angle of opening comparison over time > is there a change?**

*Increased variability overtime, but not stat significant*

##### b. Alteration

##### i. fire damage:

##### 1. proportion interior black, proportion exterior black, proportion which have both

*92%, 75%, 67%*

##### **2. is there a correlation between interior and exterior black?**

*Yes*

##### 3. location of blackening – in a table

##### **4. is there a correlation in different locations of blackening on the interior and exterior?**

*Only between int10 and ext10*

##### 5. is there a difference in blackening location in different periods?

*No sample size too small to do this well*

##### **6. is there any correlation between diameter and the appearance of blackening?**

*No.*

##### **7. is there any correlation between angle and the appearance of blackening?**

*No.*

##### 8. opacity of blackening – in a graph with period and opacity scores

##### **9. is there any significant difference in the opacity of blackening in different periods?**

*Period 6 generally is more lightly blackened on int compared to other period*

*Ext opacity similar across time*

##### ii. abrasion:

##### 1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both

*25%, 9%, 1 single frag with both*

##### **2. is there a correlation between interior and exterior abrasions?**

*No.*

##### 3. location of abrasion – in a table

##### **4. is there a correlation between different locations of abrasion?**

*Yes. Wall int and wall ext. Rim int and Rim ext never overlap.*

##### **5. direction of abrasion – proportion of different types and correlation with different locations**

*No.*

A. optional: proportion of post-depositional masking which may affect the appearance of everything above

**6. is there a correlation between presence of any type of abrasion and diameter?**

*Between diam and abrasion generally, yes, but this is likely skewed by the data from Period 6.*

**7. is there a correlation between presence of any type of abrasion and angle of opening?**

*No.*

**8. is there a correlation between period and any type of abrasion?**

*No.*

**iii. is there a correlation between presence of abrasion and presence of blackening (at all or in any particular location?)**

*No.*

**B. Olla**

**a. Morphology**

**i. general distribution of rim diameter**

**ii. diameter comparison over time > is there a change?**

*Yes. Period 6 has large mean diam than all three other periods > more pronounced with trimmed mean*

**iii. wall thickness comparison over time > is there a change?**

*Not on upper thickness. Yes on lower thickness (Period 2 is thicker than others, but by less than a 1mm)*

**iv. angle of opening comparison over time > is there a change?**

*Yes. Move toward more vertical rims over time > but not quite sign. Not in lower angle*

**b. Alteration**

**i. fire damage:**

**1. proportion interior black, proportion exterior black, proportion which have both**

*78%, 88%, 74%*

**2. is there a correlation between interior and exterior black?**

*Yes.*

**3. location of blackening – in a table**

**4. is there a correlation in different locations of blackening on the interior and exterior?**

*4int and 4ext, 2int and 2ext, 1int and 1ext, 1int and 4int, 1int and 9ext (maybe not in charcoal then?), 22int and 22ext, several of slightly less than sign. which I don't think I should actually include*

**5. is there a difference in blackening location in different periods?**

*incomplete*

**6. is there any correlation between diameter and the appearance of blackening?**

*Yes. There's a correlation between diameter and being blackened in some way (expB 1.182,  $p=0.012$ ), but not with just int or ext, so I think this is fluke (or related to the largeness of Period 6, or confused by the fact that 88% of things are blackened on the ext. Also correlation b/w int2 and diam. And ext4 and diam)*

**7. is there any correlation between angle and the appearance of blackening?**

*No.*

**8. opacity of blackening – in a graph with period and opacity scores**

**9. is there any significant difference in the opacity of blackening in different periods?**

*Yes. Int has more opacity in the earlier Period 2 compared to 3, 4, and 6 which are focused on score 1,2,3. Ext get darker in later Period 6.*

**ii. abrasion:**

**1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both**

*25%, 24%, 4%*

**2. is there a correlation between interior and exterior abrasions?**

*Yes.*

**3. location of abrasion – in a table**

**4. is there a correlation between different locations of abrasion?**

*Yes. Correlation between int rim and int wall*

**5. direction of abrasion – proportion of different types and correlation with different locations**

*A. optional: proportion of post-depositional masking which may affect the appearance of everything above Did this. It does not affect the sample much*

**6. is there a correlation between presence of any type of abrasion and diameter?**

*Yes.*

**7. is there a correlation between presence of any type of abrasion and angle of opening?**

*Angle contributes to this result. Making abrasion even more likely. Diagram needed.*

**8. is there a correlation between period and any type of abrasion?**

*Yes. This trend goes across each period*

**iii. is there a correlation between presence of abrasion and presence of blackening (at all or in any particular location?)**

*No.*

C. Jug

a. Morphology

i. general distribution of rim diameter (n=7)

**ii. diameter comparison over time > is there a change?**

*Larger egs. in Period 6, but sample size is too small for sign.*

**iii. wall thickness comparison over time > is there a change?**

*sample size too small*

**iv. angle of opening comparison over time > is there a change?**

b. Alteration

i. fire damage:

1. proportion interior black, proportion exterior black, proportion which have both

*None int, 4/7 ext*

**2. is there a correlation between interior and exterior black?**

*Yes...in that there's never int.*

3. location of blackening – in a table

**4. is there a correlation in different locations of blackening on the interior and exterior?**

*Yes. All location 2 across from handle.*

5. is there a difference in blackening location in different periods?

*sample size too small*

**6. is there any correlation between diameter and the appearance of blackening?**

*sample size too small*

**7. is there any correlation between angle and the appearance of blackening?**

*sample size too small*

8. opacity of blackening – in a graph with period and opacity scores

**9. is there any significant difference in the opacity of blackening in different periods?**

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both

*3 differing example discussed. sample size too small*

**iii. is there a correlation between presence of abrasion and presence of blackening (at all or in any particular location?)**

*Yes. One vessel has spalling on the area it has blackening.*

D. Bases

a. Morphology

i. general distribution of rim diameter

**ii. diameter comparison over time > is there a change?**

*No.*

**iii. wall thickness comparison over time > is there a change?**

*No*

**iv. angle of opening comparison over time > is there a change?**

*No, but there is a distinction between 2 groups which may correspond with pentole and ollae*

b. Alteration

i. fire damage:

1. proportion interior black, proportion exterior black, proportion which have both

*60%, 71%, 52%*

**2. is there a correlation between interior and exterior black?**

*Yes.*

3. location of blackening – in a table

**4. is there a correlation in different locations of blackening on the interior and exterior?**

*Int1 and ext1, int1 and ext7, int2 and ext2, int2 and ext3, int2 and ext10, int3 and ext3, int6 and ext6, int7 and ext8, int8 and ext10, ext1 and ext7, ext2 and ext7*

5. is there a difference in blackening location in different periods?

*More int1 in Period 2 than 6, more ext2, ext3 (not sign.), more ext7*

**6. is there any correlation between diameter and the appearance of blackening?**

*No*

**7. is there any correlation between angle and the appearance of blackening?**

*No.*

8. opacity of blackening – in a graph with period and opacity scores

**9. is there any significant difference in the opacity of blackening in different periods?**

*No: Exterior. Yes. Interior: More score 5 in Period 2 than 6, also more 2 and 5; In Period 6 there's more 3 and 4.*

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both

*12%, 39%, 9%*

**2. is there a correlation between interior and exterior abrasions?**

Yes.

**3. location of abrasion – in a table**

**4. is there a correlation between different locations of abrasion?**

Yes. *Wall\_int* and *wall\_ext* unlikely to have both; *base\_ext* and *base\_int* both unlikely

**5. direction of abrasion – proportion of different types and correlation with different locations**

Yes. *High proportion of ext base is parallel and otherwise a patch, but I did examine other stuff; Int patching is common and likely due to acidity*

A. optional: proportion of post-depositional masking which may affect the appearance of everything above *Done in footnote.*

**6. is there a correlation between presence of any type of abrasion and diameter?**

Yes. *Positive correlation with ext abrasion generally and on base specifically. No for interior*

**7. is there a correlation between presence of any type of abrasion and angle of opening?**

No.

**8. is there a correlation between period and any type of abrasion?**

No.

**iii. is there a correlation between presence of abrasion and presence of blackening (at all or in any particular location?)**

No.

E. Bowl n=13

	Frequency	Percent
4	10	76.9
6	3	23.1
Total	13	100.0

In Period 4, 6-7 fragments seem to all be the same bowl

a. Morphology *All between 14-18cm wide, with the majority in Period 4 being 16cm. These are likely the same vessel, based on their similar profile (though they do not join). Their angle of opening is similarly homogeneous, with 70° being the most popular angle. With 45° to 90° being the range.*

b. Alteration: *Blackening: int 31% (n=4), ext 92% (n=12), both 31% (4) > not correlated since there are too few int;*

type	Location of blackening <sup>1</sup>	Count (interior)	Count (exterior)
1	Around belly of vessel	-	-
2	1 patch on belly	-	1
3	2 patches on belly	-	-
4	Around top of rim	2	1
5	Around top of vessel below rim	-	-
6	Around bottom of vessel and on base	-	-
7	Forming a ring on base	-	-
8	Completely covering base	-	-
9	Entirety of vessel not including lower wall and base	2 <sup>2</sup>	10 <sup>3</sup>
10	Entirety of vessel	-	-
11	Patch in center of base (inverse of 7)	-	-
22	Everything blackened except a strip just below the rim (inverse of 5)	-	-

*Ext 4 and int 4 are correlated (chis=5.958, p=0.015); the fragments which are entirely black are difficult to do anything with. I have no whole profiles preserved, so I really don't know what the base looked like or what the function or use of these vessels were. The vessel with the most of its profile preserved is one of the pieces of the vessel represented by at least 6 fragments in period 5 (MU 4826).*

*No abrasion present.*

F. Tegame n=1

a. Morphology *-tripod legged*

b. Alteration *-ext11 and int4*

<sup>1</sup> Obviously only some of these locations are applicable to rim fragments depending on the extent of their preservation. See below for an examination of base fragments

<sup>2</sup> This is guessed/extrapolated in most of these circumstances, since the base is preserved in only 1 of these instances (forming a whole profile), but it would not be appropriate to label this vessel as being entirely covered in black.

<sup>3</sup> This is guessed/extrapolated in most of these circumstances, since the base is preserved in only 1 of these instances (forming a "whole" profile), but it would not be appropriate to label this vessel as being entirely covered in black.

G. Lids and Rims/Lid n=59

	Frequency	Percent
1	5	8.5
2	12	20.3
3	3	5.1
Valid 4	17	28.8
5	3	5.1
6	19	32.2
Total	59	100.0

Vs. with overlapping periods grouped together (1>2, 3>4, 5>6)

	Frequency	Percent
2	17	28.8
Valid 4	20	33.9
6	22	37.3
Total	59	100.0

5 of these are lids with knobs preserved;

a. Morphology

i. general distribution of rim diameter: *relatively unimodal overall (similar to ollae) ranges from 4 to 32*

**ii. diameter comparison over time > is there a change?**

*Yes. Just looking at the graph suggests obviously larger lid diam. KW shows that there's a significant difference only between Period 2 and 6 (mean rank period 2=12.44, period 6=25.84, chis=13.325, p=0.000) and Period 4 and 6 (mean rank period 4=15.78, mean rank period 6=26.70, chis=8.353, p=0.004), but not quite significant between Period 2 and 4.*

**iii. wall thickness comparison over time > is there a change?**

*No difference in wall thickness. Every period ranges from 3.5mm to 9.48mm*

**iv. angle of opening comparison over time > is there a change?**

*No. Although the graph suggests that they get less vertical overtime, there is not a statistically significant difference between any of the periods.*

b. Preservation: *these lids are on average 18.10% preserved (min 5, max 100) with a trimmed mean of 14.64%; 97% are classed as having "sharp" edges (n=57); only 31% (n=18) have any incrustation (89% of them are 50% visible or more on the int and 94% are 80% visible or more on the ext)*

c. Alteration

i. fire damage:

1. proportion exterior black, proportion exterior interior, proportion which have both 81%, 90%, 78%

**2. is there a correlation between interior and exterior black?** *Yes. Chis=10.155, p=0.001*

3. location of blackening – in a table

type	Location of blackening <sup>4</sup>	Count (interior)	Count (exterior)
1	Around belly of vessel	-	-
2	1 patch on belly	11	10
3	2 patches on belly	-	-
4	Around top of rim	23	23
5	Around top of vessel below rim	2	5
6	Around bottom of vessel and on base	-	-
7	Forming a ring on base	-	-
8	Completely covering base	-	-
9	Entirety of vessel not including lower wall and base	-	-
10	Entirety of vessel	17	14
11	Patch in center of base (inverse of 7)	1	3
22	Everything blackened except a strip just below the rim (inverse of 5)	-	-

**4. is there a correlation in different locations of blackening on the interior and exterior?** *Yes. Int 4 and ext 2 negatively (chis=7.693, p=0.006); almost int 2 and ext 2 (chis=3.620, p=0.057); int 4 and ext 4 (chis=24.448, p=0); 5int and 5 ext 4.602, p=0.032) > what does this actually look like?; ext 10 and int 4 (chis=4.707, p=0.030); int 10 and ext 10 (chis=7.182, p=0.007); ext 11 and int 11 (chis=18.989, p=0.000)*

<sup>4</sup> Obviously only some of these locations are applicable to rim fragments depending on the extent of their preservation. See below for an examination of base fragments

5. is there a difference in blackening location in different periods? *The only notable difference (and statistically significant difference) is that int 2 shows up proportionally far more in Period 4 than in the other 2 periods (I did this by re-coding Period 4 as 1 and all other periods as 0 and then did a chisquare test b/w periods and int 2) (chis=13.856, p=0)*

**6. is there any correlation between diameter and the appearance of blackening?** *The appearance of blackening on the interior of the vessel generally (that is, not any 1 location of blackening on its own) is negatively correlated (to an ALMOST significant degree) with diameter. That is, as the diameter of the lid gets smaller, it is less likely to be blackened. ExpB=0.888, and sig.=0.054. Otherwise, no other type of blackening is linked to diam.*

**7. is there any correlation between angle and the appearance of blackening?** *No.*

8. opacity of blackening – in a graph with period and opacity scores *done. No opacity of 5, generally evenly distributed in different periods.*

**9. is there any significant difference in the opacity of blackening in different periods?** *Generally even distribution. On the interior, the most prevalent in opacity of score 2, and there is a significant difference between the distribution of period 4 vs. period 6. Period 6 on the whole has higher opacity (concentrated on 3 and 4) than Period 4 (mostly 2 and 3). The mean rank of period 4 is 13.31 and of period 6 is 21.43 (chis=6.431, p=0.011). On the exterior, the opacity in every period is concentrated at 2 and 3 with no significant difference between the periods.*

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both 27%, 8%, 3%

**2. is there a correlation between interior and exterior abrasions?** *No.*

3. location of abrasion – in a table

Location of abrasion	Count (interior)	Count (exterior)
Abrasion on base	-	-
Abrasion on wall	4	2
Abrasion on rim	13	4

**4. is there a correlation between different locations of abrasion?** *No.*

**5. direction of abrasion – proportion of different types and correlation with different locations**

*rim ext: 2/4 parallel, 3 patches (1 cmsq, 3cmsq, 9cmsq); wall ext ½ is parallel, 1 is 64cm patch (this is MU 3430 and essentially the whole exterior is rough); rim int: 8/13 parallel, 1/3 diag, 2/13 perp, 2 patches (3cmsq and 16 cm sq); wall int 0/4 parallel (neg corr. Chis=5.33, p=0.021), ¼ diag, ¼ perp, 2 patches (9cm sq, 16 cm sq)*

**6. is there a correlation between presence of any type of abrasion and diameter?** *Yes. Diameter is positively correlated with rim int abrasion (expB=1.131, sig=0.04); no other correlations*

**7. is there a correlation between presence of any type of abrasion and angle of opening?** *No*

**8. is there a correlation between period and any type of abrasion?** *No.*

**iii. is there a correlation between presence of abrasion and presence of blackening (at all or in any particular location?)** *No.*

## 2. Internal redslip ware

-general discussion of the definition of the ware and the forms in which it appears

### A. Tegame

#### a. Morphology

i. general distribution of rim diameter

**ii. diameter comparison over time > is there a change?**

*No. Very regular across time*

**iii. wall thickness comparison over time > is there a change?**

*No. Very regular across time*

**iv. angle of opening comparison over time > is there a change?**

*No. Very regular across time*

#### b. Alteration

i. fire damage:

1. proportion interior black, proportion exterior black, proportion which have both  
*34%, 47%, 20%....just whole is 0, 67%, and 24%*

**2. is there a correlation between interior and exterior black?**

*Not quite. (0.07)*

3. location of blackening – in a table

**4. is there a correlation in different locations of blackening on the interior and exterior?**

*Int4 and ext10, int4 and ext4, int1 and ext5,*

5. is there a difference in blackening location in different periods?

**6. is there any correlation between diameter and the appearance of blackening?**

*No. consistency of use of different sizes? Or low sample size?*

**7. is there any correlation between angle and the appearance of blackening?**

8. opacity of blackening – in a graph with period and opacity scores

**9. is there any significant difference in the opacity of blackening in different periods?**

*No. consistent use over time int and ext*

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both  
*63%, 13%, 3%*

**2. is there a correlation between interior and exterior abrasions?**

*No.*

3. location of abrasion – in a table

**4. is there a correlation between different locations of abrasion?**

*Yes. Only int and ext base.*

**5. direction of abrasion – proportion of different types and correlation with different locations**

*Rim int correlated with parallel. Wall int with diagonal and parallel*

A. optional: proportion of post-depositional masking which may affect the appearance of

everything above *Done in footnote.*

**6. is there a correlation between presence of any type of abrasion and diameter?**

*No.*

**7. is there a correlation between presence of any type of abrasion and angle of opening?**

*Yes. There is a negative correlation between the presence of interior abrasion generally and the angle of the rim. ( $\exp B=0.938$ ,  $\text{sig.}=0.001$ ). This means that as the angle decreases, by 1 unit, the likelihood of there being interior abrasion increases by 6.2%. When we isolate only interior rim abrasion, it is clear that this is the influencing factor, since here, the  $\exp B=0.094$ , and  $\text{sig.}=0.002$ , but abrasion on the int wall or base is not correlated with angle. This may mean that this prevalence of abrasion is related to more active lid use on "floppy-rimmed" irsc tegami, or more active flipping/utensil manipulation of stuff in the pan with floppy-rimmed vessel.*

**8. is there a correlation between period and any type of abrasion?**

**iii. is there a correlation between presence of abrasion and presence of blackening (at all or in any particular location?)** *No.*

B. Tegame bases

a. Morphology

i. general distribution of rim diameter

**ii. diameter comparison over time > is there a change?**

*No.*

**iii. wall thickness comparison over time > is there a change?**

*No.*

**iv. angle of opening comparison over time > is there a change?**

*No.*

b. Alteration

i. fire damage:

1. proportion exterior black, proportion exterior interior, proportion which have both  
*23%, 77%, 23%*

**2. is there a correlation between interior and exterior black?**

*Yes, but see note (sig. 0.068)*

3. location of blackening – in a table

**4. is there a correlation in different locations of blackening on the interior and exterior?**

*Yes. All undersides. Int8 and ext8*

5. is there a difference in blackening location in different periods?

*Sample size too small, but no.*

**6. is there any correlation between diameter and the appearance of blackening?**

*No.*

**7. is there any correlation between angle and the appearance of blackening?**

*No.*

8. opacity of blackening – in a graph with period and opacity scores

**9. is there any significant difference in the opacity of blackening in different periods?**

*No.*

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both  
*27%, 27%, only 2 total.*

**2. is there a correlation between interior and exterior abrasions?**

*No.*

3. location of abrasion – in a table

**4. is there a correlation between different locations of abrasion?**

*No. sample size too small*

**5. direction of abrasion – proportion of different types and correlation with different locations**

A. optional: proportion of post-depositional masking which may affect the appearance of

everything above

**6. is there a correlation between presence of any type of abrasion and diameter?**

*No. sample size too small*

**7. is there a correlation between presence of any type of abrasion and angle of opening?**

*No. sample size too small*

**8. is there a correlation between period and any type of abrasion?**

*No. sample size too small*

**iii. is there a correlation between presence of abrasion and presence of blackening (at all or in any particular location?)** *No.*

C. Semi-diagnostic: b\_bases n=13 *Done*

D. Pentola

a. Morphology

i. general distribution of rim diameter

**ii. diameter comparison over time > is there a change?**

*Yes. In that they only appear later.*

**iii. wall thickness comparison over time > is there a change?**

*No. Homogenous*

**iv. angle of opening comparison over time > is there a change?**

*No. Homogenous*

b. Alteration *Sample size too small*

i. fire damage:

1. proportion exterior black, proportion exterior interior, proportion which have both

**2. is there a correlation between interior and exterior black?**

3. location of blackening – in a table

**4. is there a correlation in different locations of blackening on the interior and exterior?**

5. is there a difference in blackening location in different periods?

**6. is there any correlation between diameter and the appearance of blackening?**

**7. is there any correlation between angle and the appearance of blackening?**

8. opacity of blackening – in a graph with period and opacity scores

**9. is there any significant difference in the opacity of blackening in different periods?**

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both

**2. is there a correlation between interior and exterior abrasions?**

3. location of abrasion – in a table

**4. is there a correlation between different locations of abrasion?**

**5. direction of abrasion – proportion of different types and correlation with different locations**

A. optional: proportion of post-depositional masking which may affect the appearance of

everything above

**6. is there a correlation between presence of any type of abrasion and diameter?**

**7. is there a correlation between presence of any type of abrasion and angle of opening?**

**8. is there a correlation between period and any type of abrasion?**

**iii. is there a correlation between presence of abrasion and presence of blackening (at all or in any particular location?)**

E. Pentola base

a. Morphology

i. general distribution of rim diameter

**ii. diameter comparison over time > is there a change?**

*No. But they're mostly in Period 6*

**iii. wall thickness comparison over time > is there a change?**

*No. lots of variability*

**iv. angle of opening comparison over time > is there a change?**

*No. But lots of variability.*

b. Alteration *Incomplete But sample sizes really too small to do much.*

i. fire damage:

1. proportion exterior black, proportion exterior interior, proportion which have both

**2. is there a correlation between interior and exterior black?**

3. location of blackening – in a table

**4. is there a correlation in different locations of blackening on the interior and exterior?**

5. is there a difference in blackening location in different periods?

**6. is there any correlation between diameter and the appearance of blackening?**

**7. is there any correlation between angle and the appearance of blackening?**



8. opacity of blackening – in a graph with period and opacity scores

**9. is there any significant difference in the opacity of blackening in different periods?**

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both

**2. is there a correlation between interior and exterior abrasions?**

3. location of abrasion – in a table

**4. is there a correlation between different locations of abrasion?**

**5. direction of abrasion – proportion of different types and correlation with different locations**

A. optional: proportion of post-depositional masking which may affect the appearance of

everything above

**6. is there a correlation between presence of any type of abrasion and diameter?**

**7. is there a correlation between presence of any type of abrasion and angle of opening?**

**8. is there a correlation between period and any type of abrasion?**

**iii. is there a correlation between presence of abrasion and presence of blackening (at all or in any particular location?)**

3. Black gloss

A. General discussion of the definition of the ware and the forms in which it appears

-Variability within the assemblage between bowls and plates over time

*More plates in the later periods > consistent with what we already knew about the morphology; plates are wider overall > Only difference sign between Period 2 and Period 6; trimmed mean makes difference between each period and period 6 > they get wider over time*

B. Bowls  $n=104$

a. Morphology

i. general distribution of rim diameter

**ii. diameter comparison over time > is there a change?**

*Period 2 is sign. Smaller than every other period*

**iii. wall thickness comparison over time > is there a change?**

*No difference between periods.*

**iv. angle of opening comparison over time > is there a change?**

*Between Period 2 and Period 3 there is a significant difference (KW: mean rank: Period 2=30.47, Period 3=20.79,  $\chi^2=4.857$ ,  $p=0.028$ ). This means that Period 2 rims run more towards vertical and incurved. There is also a significant difference between Period 2 and Period 4 (mean rank Period 2= 39.31, Period 4=23.43,  $\chi^2=11.901$ ,  $p=0.001$ ). There are no other significant differences between periods.*

**v. change in ratio of height to width?**

b. Alteration

i. Discussion about factors affecting abrasion in black gloss:

1. Results of accretion 30% ( $n=31$ ) have crust; int: 22 are 20% covered or under; ext: 14 are 20% or under > more calcium typically means more slip removed in a patchy fashion

2. Results of attrition (fracture rounding) 92% are 1 and 8% are 2. There are no 3s.

3. Qualitative assessment of state of post-depositional processes affecting this assemblage > is there a difference between the different SUs or Periods?

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both  
69%, 75%, 58%

**2. is there a correlation between interior and exterior abrasions?**

*No. Likely because there are 10 frags which have none and that messes up the chisquare (but all of these have been double checked on Jan 23 2013, and they're all right). Should I be ignoring the exterior abrasion, or the vessels which only have it outside? Perhaps I need to determine if it's mostly parallel base abrasion.*

3. location of abrasion – in a table

Location of abrasion	Count (interior)	Count (exterior)
Abrasion on base	11	10 > are these all the whole vessels?
Abrasion on wall	19	18
Abrasion on rim	62	70

**4. is there a correlation between different locations of abrasion?**

*Base ext and base int ( $\chi^2=45.122$ , 0.000), base ext and wall int ( $\chi^2=4.973$ , 0.026)*

**5. direction of abrasion – proportion of different types and correlation with different locations**

*If we look at only whole vessels ( $n=9$ ), 8 have abraded ext bases (all of which are parallel wear on their foot edges), 2 have abraded exterior walls (minor parallel where along wheel marks), 7 have abrasion on their ext rim which is parallel (on exterior carination); Int base: 6/7 are parallel, 0/7 diag (negatively correlated), 1/7 perp, and 5/7 have 2 types, wall int: 3/5 parallel, 1/5 diag, 1/5 perp, and 2/5 have 1 types, rim int: 5/5 parallel; **RIMS**: wall int 8/13 parallel ( $\chi^2=11.844$ ,  $p=0.001$ ), 4/13 diag*

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( $\chi^2=11.186$ ,  $p=0.001$ ), 1/13 perp ( $\chi^2=3.754$ ,  $p=0.053$ ), 4/13 have 2 types; rim int 51/56 are parallel ( $\chi^2=4.362$ ,  $p=0.037$ ), negatively correlated with perp, 4/56 have diag, (3 of the diag have parallel, 3 of the parallel have diag); wall ext negatively correlated with diag; rim ext 59/63 parallel ( $\chi^2=5.024$ ,  $p=0.025$ ), rim ext negatively correlated with diag.

**6. is there a correlation between presence of any type of abrasion and diameter?**

Woah! Yes! See hand-written notes.

**7. is there a correlation between presence of any type of abrasion and angle of opening?**

None except negative correlation b/w rim angle and int wall abrasion:  $\exp B=0.973$ ,  $p=0.049$

**8. is there a correlation between period and any type of abrasion?**

C. Plates  $n=97$ , 89 rim, 7 whole

a. Morphology

i. general distribution of rim diameter

**ii. diameter comparison over time > is there a change?**

No. Not overall or between any pairs of periods.

**iii. wall thickness comparison over time > is there a change?**

No.

**iv. angle of opening comparison over time > is there a change?**

No.

**v. change in ratio of height to width?**

b. Alteration

i. Discussion about factors affecting abrasion in black gloss:

1. Results of accretion

2. Results of attrition (fracture rounding)

3. Qualitative assessment of state of post-depositional processes affecting this assemblage > is there a difference between the different SUs or Periods?

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both

81%, 73%, 62%

**2. is there a correlation between interior and exterior abrasions?**

No.

3. location of abrasion – in a table

Location of abrasion	Count (interior)	Count (exterior)
Abrasion on base	5	7
Abrasion on wall	29	33
Abrasion on rim	72	60

When you isolate just the 7 whole vessels, you see that of the interior abrasion, int base has 2/4 diag, and 2/4 perp, plus 1 perp with patch, 1 diag with 1 perp; int wall has 2/2 perp, plus “concentric wear”; and int rim has 1/6 parallel, 1/6 diag, and 4/6 perp scratches; for exterior whole vessels, 6/6 base ext is 6/6 parallel, ext wall 1/1 is parallel, rim ext is 6/6 parallel; on rims: base int 1/1 is parallel, wall int 20/27 parallel ( $\chi^2=9.333$ ,  $p=0.002$ ), 1/27 diag, 4/27 perp ( $\chi^2=6.908$ ,  $p=0.009$ ), with 1 eg. of diag with 1 perp scratch, 1 eg. of parallel with perp, 1 eg. of diag with 1 perp, 1 perp with 1 diag. rim int 63/65 parallel ( $\chi^2=51.6125$ ,  $p=0.00$ ), 1/65 diag. 1/65 perp, plus 1 parallel has 1 perp, and 1 diag has 1 perp.

**4. is there a correlation between different locations of abrasion?**

**5. direction of abrasion – proportion of different types and correlation with different locations**

**6. is there a correlation between presence of any type of abrasion and diameter?**

No.

**7. is there a correlation between presence of any type of abrasion and angle of opening?**

**8. is there a correlation between period and any type of abrasion?**

D: Black gloss bases

Periods		Frequency	Percent
Valid	1	3	3.1
	2	21	21.6
	3	25	25.8
	4	18	18.6
	5	2	2.1
	6	28	28.9
	Total	97	100.0

		Frequency	Percent
Valid	olla	2	2.1
	jug	11	11.3
	bowl	12	12.4

	plate	11	11.3
	unknown_BG	46	47.4
	Total	82	84.5
Missing	System	15	15.5
Total		97	100.0

Unknown\_BG refers to vessels which are clearly a bowl or a plate (and not a closed form) but whose preservation precludes being able to distinguish between them.

		wares and fragments regrouped by form			Total
		bowl	plate	unknown_BG	
Period	1	0	2	1	3
	2	5	0	8	13
	3	0	2	18	20
	4	3	3	7	13
	5	1	0	0	1
	6	3	4	12	19
Total		12	11	46	69

-According to the graph breakdown, there are more identifiable plate bases than bowls in period 6 and they sort of begin to take over in period 4 or 5 (but the data is sketchy and there are always far more unknown\_BG)

For all 69 of these bowl/plate/unknown bases, 57% (n=39) have interior abrasion, 83% (n=57) have exterior abrasion, and 46% (n=32) have both. No correlation between presence int and ext.

Int abrasion: 38/39 is on base (obv), ; base int 16/38 is parallel, 10/38 is diag, 8/38 is perp and 10 of these have both (and it's likely that these bases do have both  $\chi^2=8.996$ ,  $p=0.003$ )

Ext abrasion: 57/57 is on base, 1/57 on wall (which also has abrasion on base); base ext 55/57 (96%) is parallel, 1 is perp and 1 is diag

When just bases of bowls are selected (n=12): 50% have interior abrasion, 92% (n=11) have ext, 50% have both (not stat. sign); all the abrasion is on the base, not the wall; 4/6 parallel, 1/6 diag and 1/6 perp (can't calculate chisquare because there aren't non-base eg); ext 10/11 parallel, 1/11 diag;

When just bases of plates are selected (n=11): 82% (n=9) have int, 64% (n=7) have ext, 55% (n=6) have both; base int 9 (3/9 parallel, 2/9 diag, 3/9 perp) (PLUS 3 criss-crossing, which the database notes reveal are 2 additional diag on a diag and parallel scratch and 1 additional diag on a perp scratch > MU 5080 good eg. with microphotos), base ext 7 (all parallel), wall ext 1

#### 4. Ceramica da mensa, dispensa, per la preparazione

		Frequency	Percent
	pentola	3	2.5
	olla	35	29.7
	clibanus	1	.8
	jug	18	15.3
	bowl	19	16.1
	cup	2	1.7
	unguentarium	5	4.2
	Total	83	70.3
Missi ng	System	35	29.7
Total		118	100.0

All the of the "blanks" (n=35) were checked by me and they are all sherds which are too short to properly type (even though their rims are more than 4% preserved)

With the clibanus removed:

		Frequency	Percent
Valid	pentola	3	3.7
	olla	35	42.7
	jug	18	22.0
	bowl	19	23.2
	cup	2	2.4
	unguentarium	5	6.1
	Total	82	100.0

A. Bowls/Mortaria Generally far more in the first 3 periods than in the last two (period 5 doesn't matter, but its lacking in Period 6 is notable)

a. Morphology

		Frequency	Percent
Valid	2	11	57.9
	3	2	10.5
	4	5	26.3
	5	1	5.3
	Total	19	100.0

18 are rims, 1 is whole (MUS 2884 is a gorgeous example)

i. general distribution of rim diameter

ii. diameter comparison over time > is there a change?

Yes, but only between period 2 and period 4. According to a KW test, period 2 has a higher "mean rank" therefore its diameter is distributed towards the higher end (10.27) in comparison to Period 4 (4.60) to a statistically significant degree (chisq=4.902, p=0.027). When I remove the 2 mortaria outliers, there is still a significant difference between Period 2 and Period 4. The mean rank of Period 2 is 9.11 and Period 4 is 4.6, while the chisq=3.763, p=0.052

iii. wall thickness comparison over time > is there a change?

The thickness of the walls is nearly identically distributed as the diameter (pearson correlation R=0.820) > This is connected to the fact that there are 2 mortaria in this sample which both have a wider diameter and a thicker wall than the rest of the bowls. These two probably mortaria (MU 850 which is 52 cm in diameter and, MU 3388 which is 43 cm in diameter) are both in Period 2. There is not, however a significant difference in any of the thicknesses with or without these mortaria outliers removed.

iv. angle of opening comparison over time > is there a change?

No. The distribution of angle in various periods is almost identical (this is with and without the mortaria included in the calculation). While Period 2 has the widest distribution (but also the most samples), it is well-matched by period 4's range of angles.

v. change in ratio of height to width?

b. Alteration

i. Discussion about factors affecting abrasion: Visibility is the main thing.

1. Results of accretion Very little mineral incrustation. Only 1 fragment on its ext (15% covered). Only 1 fragment with its int rim chipped (3cm chip)

2. Results of attrition (fracture rounding) 79% of edges "sharp" 21% "slightly rounded"

3. Qualitative assessment of state of post-depositional processes affecting this assemblage > is there a difference between the different SUs or Periods? No. All periods equally well-preserved.

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both 37%, 47%, 26%

2. is there a correlation between interior and exterior abrasions? No.

3. location of abrasion – in a table

Location of abrasion	Count (interior)	Count (exterior)
Abrasion on base	1	1
Abrasion on wall	5	6
Abrasion on rim	1	2

4. is there a correlation between different locations of abrasion? The only 2 locations which have a statistical relationship are rim ext and wall int which overlap 2x (chis=6.259, p=0.12). Base int and base ext also overlap 1 (chis=19, p=0.00), but this is because there is only 1 fragment which has its base preserved (MUS 2884)

5. direction of abrasion – proportion of different types and correlation with different locations

base int 1/1 diag (chis=7, p=0); wall int 1/5 parallel, 1/5 perp, 3/5 patched (2 are 25cm and 1 36 cm); rim int 1/1 parallel; Two of the bowls with interior patching are the mortaria which are pedestalled around their interior grit. The third is the same form and size as a mortarium (35cm wide, 30° opening) but does not have obviously-added grit. Its interior surface is worn out enough to show the interior inclusions "bursting" out from its surface (from the database: "is all cracked with inclusions bursting out of the surface"). Its fabric places it clearly within the class of bowls identified as "impasto chiaro sabbioso," a yellowish/green fabric with black volcanic inclusions

popularly used in central Italy from the 5<sup>th</sup> or 4<sup>th</sup> century BCE. This fabric comes in forms which are mortaria (which or without pouring spouts) or basins (basically identical to mortaria, but without added interior grits)

**6. is there a correlation between presence of any type of abrasion and diameter?** Yes, wall int but only when the mortaria (850, 338, and the poss. 2890) are included (expB=1.154, sig=0.037)

**7. is there a correlation between presence of any type of abrasion and angle of opening?** Not really. The closest is wall ext is negatively correlated with angle (expB=0.954, sig=0.064)

**8. is there a correlation between period and any type of abrasion?** No. each period has half of their fragments abraded in some way.

#### B. Ollae

	Frequency	Percent
2	13	37.1
3	7	20.0
4	13	37.1
5	1	2.9
6	1	2.9
Total	35	100.0

##### a. Morphology

i. general distribution of rim diameter These are very similar in rim diameter overtime, with each period running approximately from 7 cm to 15 cm

##### ii. diameter comparison over time > is there a change?

Maybe. These only appear in period 2-5, only 1 eg. from period 5 and 6 (5 has almost nothing anyway, but its lack of appearance in period 6 is surprising)

##### iii. wall thickness comparison over time > is there a change?

Yes. Upper thickness between Period 2 and Period 4 (chi sq=5.607, p=0.018) where the mean rank of Period 2 is 12.90 and of Period 4 is 6.78 > this is clear from the graph where the thickness of Period 2 clusters around 6mm and in Period 4 it clusters around 4mm; central thickness is different between Period 2 and 3, but not between 2 and 3 to a significant degree. 2 v. 3 chisq=3.012, p=0.083, where the mean rank of Period 2 is 10.10 and Period 3 is 5.83, and you can see in the graph that Period 2 clusters around 5-6mm and Period 3 around 4-5mm; isn't a difference between any of the Periods, they all cluster around 4-5mm

**iv. angle of opening comparison over time > is there a change?** No. Periods 2-4 all have a large range of rim angles between 25 and 90 degrees, with each period clustering between 60 and 70°. There is no significant difference in the distribution of their angles according to KW testing

##### v. change in ratio of height to width?

##### b. Alteration

i. Discussion about factors affecting abrasion: Visibility is potentially a problem because of the uniform colour (usually yellow-buff) of the surface and its already slightly-coarse surface in some instances. Also, over magnification can mean that seeing abrasion is difficult.

1. Results of accretion 71 % (n=25) have no mineral accretion, and 20% (n=7) have some (3 fragments, 8.6% are not reported). Of the ones with mineral crust, all of them are 50% or more visible (only 1 on the interior and 1 on the exterior are only 50% visible and the rest are more). Only 1 fragment is stained.

2. Results of attrition (fracture rounding): 71% (n=25) are coded as 1 "sharp" and 25% (n=8) are coded as 2 "slightly rounded"; 7 have a chipped lip (5 of which are 2cm long chips and 2 are 1 cm long)

3. Qualitative assessment of state of post-depositional processes affecting this assemblage > is there a difference between the different SUs or Periods? Period 2 fragments have more mineral incrustation (with 4 out of the 7 frags coming from Period 2) and all between 20 and 40% (so the percentage of the surface covered is similar to the rest of the fragments not in this period, no more no less) but otherwise, all periods are evenly distributed in terms of edge rounding

##### ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both 31%, 26%, 11% have both.

**2. is there a correlation between interior and exterior abrasions?** Not a strong relationship between int and ext abrasion

##### 3. location of abrasion – in a table

Location of abrasion	Count (interior)	Count (exterior)
Abrasion on base	0	2
Abrasion on wall	2	4
Abrasion on rim	10	4

**4. is there a correlation between different locations of abrasion?** No.

**5. direction of abrasion – proportion of different types and correlation with different locations**

rim int: 5/10 parallel, 2/10 diag, 2/10 perp, 1/10 patched (6cm); int wall ½ diag, 1 is a 6cm patch; rim ext ¾ parallel, ¼ diag, 1 has a 16 cm patch; wall ext ¼ is diag, 2/4 perp, 2 patches (1cm, 16cm); base ext 2/2 parallel

**6. is there a correlation between presence of any type of abrasion and diameter?**

No

**7. is there a correlation between presence of any type of abrasion and angle of opening?**

No. Nor with angle of body

**8. is there a correlation between period and any type of abrasion?**

No.

**C. Jugs**

	Frequency	Percent
2	4	22.2
3	8	44.4
Valid 4	3	16.7
6	3	16.7
Total	18	100.0

2 rim, 5 rim with handle, 11 whole

a. Morphology There are 3 examples with long narrow necks and rims, 2 of which have rims which are 4 and 5 cm in diameter (MU 4901, and 5758). These are morphological outliers in an otherwise homogeneous set of ovoid jugs. Their heterogeneity in terms of volume comes from the fact that their heights (And therefore proportions) vary greatly.

i. general distribution of rim diameter

**ii. diameter comparison over time > is there a change?**

There is only a difference in diameter between Period 2 and Period 3. This is case both when I remove the narrow necked outlier (MU 4901) in Period 3 and when it is included. When included, mean rank Period 2=9.88, mean rank Period 3=4.81 and chis=5.332, p=0.021; when not included, mean rank for Period 2 =8.88, mean rank Period 3=4.36 and chis=4.811, p=0.028.

**iii. wall thickness comparison over time > is there a change?**

no. not at any point in the wall height.

**iv. angle of opening comparison over time > is there a change?**

No.

**v. change in ratio of height to width?**

b. Alteration

i. Discussion about factors affecting abrasion in black gloss:

1. Results of accretion Only 5 fragments (28%), interior there's only 2 and they're both 10% or under; exterior, there's one which is 75% covered, but the other 4 are 20% and under

2. Results of attrition (fracture rounding) 94% are "sharp" and 6% (n=1) are "slightly rounded"

3. Qualitative assessment of state of post-depositional processes affecting this assemblage > is there a difference between the different SUs or Periods? No. All sherds well-preserved

ii. abrasion:

1. proportion with interior abrasion, proportion with exterior abrasion, proportion with have both 11%, 61%, 5% (n=1) there are 6 which have no abrasion at all.

2. is there a correlation between interior and exterior abrasions? No. The may be little interior abrasion noted because so many of these are whole closed forms

3. location of abrasion – in a table

Location of abrasion	Count (interior)	Count (exterior)
Abrasion on base	0	8
Abrasion on wall	0	3
Abrasion on rim	2	1

**4. is there a correlation between different locations of abrasion? No.**

**5. direction of abrasion – proportion of different types and correlation with different locations**

rim ext 1/1 parallel, wall ext 1/3 parallel, 1/3 perp, 2/3 patch (1 cmsq and 400 cmsq); base ext 7/8 parallel,

1 patch (25cmsq)

**6. is there a correlation between presence of any type of abrasion and diameter? No**

**7. is there a correlation between presence of any type of abrasion and angle of opening? No**

**8. is there a correlation between period and any type of abrasion? No**