Pigment and Clay Variation in Salado Polychrome Ceramics

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This project attempted to replicate viable pigment and clay combinations employed to make Salado polychrome ceramics. Local clays and pigments, from the Gila River Valley, were used to show how effectively different pigments adhere to clays. It also explored processing organic and mineral materials potentially used as pigments. Results showed that several variables affect how pigments and clays interact during the firing process and using experimental techniques allowed for nuanced understandings of the limits of suitable materials.

Background

Salado Polychromes are identifiable through their technological and compositional attributes.

Studies show widespread local production of these vessels throughout the southern Southwest.

The widespread use of similar motifs and layouts on Salado polychrome vessels suggests an inclusive ideology that was associated with a communal identity across the region, including the Upper Gila region.

Clays in the primary range of Salado polychrome distribution have predominantly illite and smectite mineral compositions. These minerals' sheet-like structures have high plasticity and an appropriate shrink-swell capacity for firing.

NAA and petrography studies have shown that clays are tempered with a volcanic sand. Vessels are formed by the coil and scrap method. White slip then organic black pigment, and finally red slip, is applied to the formed vessel.

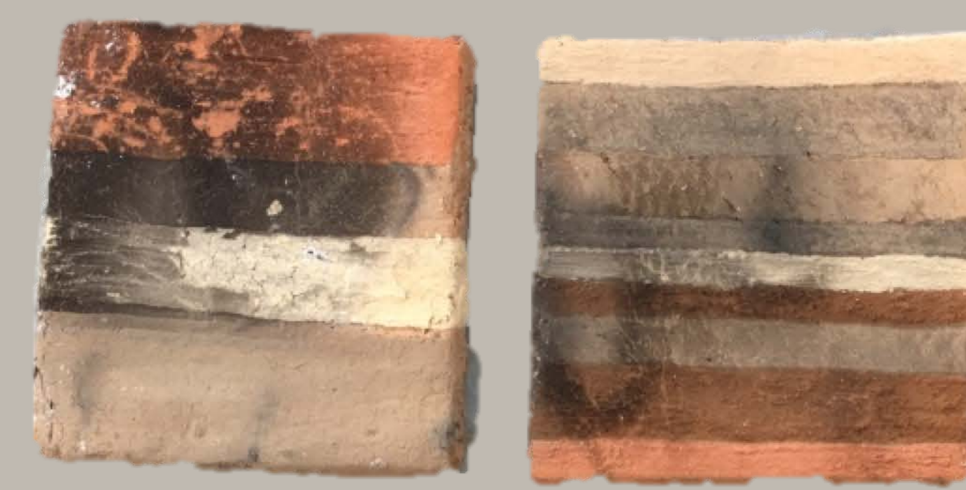
The utilization of local materials for production suggests that there is a range of clay composition that is suitable for applying Salado polychrome slips and paint.

Methods

Two experiments were conducted to replicate Salado polychrome paints and slips using various recipes and to examine pigment adherence to clay. In both experiments, clay was mixed with a sand temper at a 3:1 clay to sand ratio. Clay tiles were formed using the rolled coil method and smoothed by hand and gourd scraper. At the leather-hard stage the tiles were burnished with a polishing stone. The same pigments were used on both clays. Manganese was applied to tiles with black walnut to show side-by-side comparisons between mineral and organic pigments in the same firing environment.

Both experiments used a pit fire to create a low oxygen, reducing environment. For Experiment 1, the fire was built with mesquite wood and the measured temperature was 680 C. Experiment 2 used untreated, precut pine boards and the temperature was not measured. The tiles were fired for 40 minutes then removed from the fire to cool down naturally.

In order to test pigment interactions, Experiment 1 used a New Mexico redware clay, and Experiment 2 used a New Mexico brownware clay. In Experiment 1, the slip and pigment was applied to clay at the greenware stage, just before firing. In Experiment 2, slip and pigment was applied at the leather-hard stage, then dried further before firing.



Experiment 1
L: H, raw clay, DE, BW
R: mix of H, DE & BW, BW, raw clay, BW, yellow ochre, raw clay, yellow ochre, hematite

Mesquite sap, raw clay, mesquite sap, BW, raw clay, BW, raw clay

Experiment 2
L: M, raw clay, BW
R: (top half) WS with BW applied on top, (bottom half) WS with BW applied beside

Pigment processing

Black walnut (BW) – crushed green shells boiled with water and mixed with mesquite sap after reduction

Manganese (M) – ground against wet sandstone

Hematite (H) – ground with stone pestle in wood mortar

Diatomaceous earth (DE) – collected from outcrop and sifted through fine mesh, mixed with water

White clay slip (WS) – sifted through fine mesh, mixed with water

Experiment 1 showed overall low efficacy of pigment adherence to the clay. Experiment 2 produced some vessels with high pigment adherence, and some with low adherence. The temperature of the fire is often analyzed in relation to the remaining carbon content of pigments, but placement within the fire suggests the temperature also affects the binding of clay and pigments. Both experiments showed dilute saturation of red pigment. The Fe concentration of the pigment could determine this saturation.

Although the widespread utilization of local materials suggests a range of suitable methods to create Salado polychromes, unsuccessful firings show the limits to that range. Experimental results reveal the sophistication and complexity in manufacturing Salado polychrome ceramics, attesting to the high skill level of the potters

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