Case Study: The Technical Examination of a "Nok" Ceramic Sculpture
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Case Study and Goals

This case study features the conservation and technical study of a presumed ancient African ceramic sculpture. Students will receive a brief introduction to African archaeology, issues related to the art market and African art, and analytical imagery used in the study of 3-dimensional works of art.

This document serves as a companion to the PowerPoint presentation; please refer to slides as numbered in the presentation. The "notes" section of each slide contains the image citations. This case study includes both a further reading bibliography as well as a glossary; words included in the glossary are italicized in the text below.

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Introduction

Following an accidental fall, this African ceramic sculpture, identified as having been produced by the Nok culture, was brought to a private conservation studio for conservation/restoration. The object was in 50+ pieces, and several areas of the piece had become pulverized. Noting that this condition allowed for unusual access to the interior of the sculpture, and given the need for greater study of Nok culture, the client supported an extensive technical study of the piece.

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Description

The monumental sculpture features a male figure, seated on a stool with one foot on the ground and the other crossed, ankle to knee. He wears elaborate jewelry, with strands of a necklace that drape along his chest, a raised and banded collar around his neck, and a cuff bracelet and upper arm band. His belt and headband are banded as well, carrying the geometric pattern beyond the torso and arm. His head is globular, with two bulbous buns for hair. His expressive facial features are highly stylized, a Nok hallmark, featuring triangular eyes with pierced pupils, wide lips and arched eyebrows.

Although no find location or other excavation information was provided to the conservators, the object had received analytical tests to determine the firing date (Thermo-luminescence, or TL, dating, discussed below); these earlier tests supported a date consistent with the Nok culture, roughly 2000 BP (before present).

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Nok Culture

The size and style of the object confirmed its identification as Nok. This culture was first recognized and studied during the first half of the 20th century, following accidental finds of these highly stylized terra cotta sculptures in central Nigeria during tin mining operations. By 1943, several objects had been

unearthed, attracting the attention of Bernard Fagg, a local British civil administrator and archaeologist. Fagg named the culture "Nok" after a local village where some of the finds had originated; other similar objects were unearthed in nearby villages, essentially forming a sort of cultural corridor between the Niger and Benue Rivers in the center of the country.[i]
Analytical dating techniques suggest that the culture existed sometime in the mid-first century BCE to around the second/third centuries CE.[ii]

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Unfortunately, very little systematic excavation has occurred within the identified Nok cultural region. Rupp (Rupp et al., 2005) discusses the current state of research, and addresses the challenges inherent to studying a culture whose known cultural remains often lack strong *provenance*. Some interpretation of the remarkable ceramic finds have been illuminated by excavations from earlier in the 20th century, including those directed by Fagg; these find sites suggest that certain Nok ceramics might be associated with ancient iron smelting sites; given the mineral-rich deposits of this geographic area, such a relationship between activity and object seems plausible. (Siegmann, 2009 and Chesi, 2006, page 25). Still, it must be acknowledged that lack of more extensive fieldwork, coupled with informal digging to satisfy the art market, complicate attempts to better understand Nok culture and the significance of these impressive ceramic objects.

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Concurrently, the art market's interest in these highly collectible pieces has led to the entry of both pastiche objects and true fakes to the market. Work has been done to identify problematic pieces; nevertheless, it is quite possible that some of these forgeries have entered institutional collections. Mark Rasmussen has studied several Nok figures using various imaging techniques, revealing the multiple fragments that compose certain monumental examples. (Rasmussen, page 19+) In such cases, a varying degree of "authentic" Nok fragments may be present, making analysis very difficult.

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Of those pieces that seem to be authentic—either excavated by Fagg and others or recognized as Nok towards the first part of the 20th century—a distinctly stylized approach to modeling figures, and indeed facial features, can be identified. Such characteristics often include a dominant head with large, triangular eyes and pierced pupils, elaborate hair styling which might represent costumes (or as has been suggested, illness in some form, see Department of Arts of Africa, http://www.metmuseum.org/toah/hd/nok/hd_nok.htm), jewelry around the neck/arms; nostrils are also pierced in some pieces. The clay body itself is often somewhat heterogeneous, with aggregate of fired ceramic and other material added to modify and stiffen the soft *terracotta* clay; this addition to the clay body is sometimes referred to as *grog*. Surface finish is often fine, with a burnished *slip* (see Fagg, 1994, pages 80+; Garlake, 2002, page 111)

It is interesting to note that the stylized features mentioned above might have also served practical functions. Piercing of the nose, eyes and even mouth would have allowed for greater ease of moisture

release during the firing of these thick-walled sculptures; this in turn would have reduced the tendency towards cracking and other such firing flaws.

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The forms themselves were likely built through coiling, just as in a pinch pot made in pre-school; this method of building ceramic vessels and objects contrasts with wheel-throwing, where the vessel walls will be somewhat more uniform and perhaps thinner (though it should be noted that very fine forms can be achieved through coiling/smoothing/sculpting). This technique can result in slightly denser bands of clay body, visible as slightly more opaque lines within an x-radiograph. The angular, sharp features of Nok pieces were likely created through carving the leather hard clay, before firing. Such working methods may relate to wood carving traditions, where designs are created through a subtractive technique, meaning material is removed rather than added to create imagery. (Chesi, 2006, pg. 25)

Once ready to be fired, Nok sculptures would have been arranged in a heap and a fire built below and around the pieces. This method is less controllable than, for instance, a kiln, and it is likely that the firing conditions might vary throughout the pile, such that local environments in one area would be reducing and in another, perhaps even on the same object, oxidizing; this variation might result in black or sooty looking areas where the heated clay was oxygen starved. (For a more detailed discussion of ceramic technology, included a helpful section on firing, see Rice, 1987.)

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Condition

As noted, the features and manufacture as deduced through close examination were consistent with Nok-type ceramics. However as the conservators were able to view the interior, it was immediately clear that the object had been pieced together from many different types of *sherd*s, likely from several different original objects. In addition to a different surface treatment, and in some cases, varying body color, several *sherds* had clearly been filed along the edges in order to better fit into their present location on the piece. Red earth/mud and, in some cases, probably a thin red paint, had been applied all over the surface in an effort to disguise these joins. Further a thick, brown adhesive was visible throughout the interior, holding pieces together and in many places, dripping down from these joins. This adhesive was likely of significant strength, in fact, undoubtedly stronger than the ceramic itself, as when the piece fell and the damage sustained, the breaks occurred in the middle of the ceramic *sherds* and not along break edges that were previously joined. It is worthwhile to note that it is in part for this reason that conservators are often concerned with the local strength of art media during treatment, as an appropriate adhesive would fail before the art work itself broke. In this way, damage during an accidental fall or other accident might be minimized to previously existing problems.

In summary, all this visual information suggested that the object was perhaps a *pastiche*, and at some point in history, many disparate ceramic figures were combined to create a whole object which would be more attractive to collectors and perhaps fetch more money on the market. This unexpected

observation led to the proposal of a detailed technical study of the object, following the conservation treatment of the piece.

Technical Study

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The decision to undertake a technical study of an artwork should not be proposed lightly. Not only does the work take time, but it is also expensive, and in some cases, requires that a small sample(s) be removed from the artwork in question. In this case, the conservators had genuine reason to suspect that the object had been misidentified as authentic at some point in its history. Accordingly, a systematic plan was devised, in order to better understand the piece in question. The tests to be undertaken included: Fourier Transform Infra-red Spectroscopy (FTIR), Computer Tomography (CT) scanning, and finally Thermo-luminescence dating (TL).

FTIR

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The conservators first looked to identify the brown adhesive on the interior of the piece, specifically to determine if the material was a tree gum or resin that may have been a traditional artist's material.

FTIR is used by conservators and conservation scientists to identify unknown materials; this technique is often the first method chosen in order to identify binding media in paint samples. As such, FTIR requires destructive sampling, meaning original material must be removed from the work of art. As with an overall technical study, this decision must be carefully considered. The procedure works as follows: once removed and prepared, the sample is introduced to a closed chamber where it is exposed to varying levels of infrared energies. Depending on its composition, the sample will absorb some of this energy, creating a more energetic, "excited" state within the molecular structure. A detector is placed behind the sample, such that the energy levels that were absorbed can be recorded; this information is then analyzed in order to identify the material present. This technology is explained in many science texts and websites; it is advisable to have students review in order to supplement the very brief and simplified explanation here.

The results of the FTIR analysis undertaken on behalf of the Nok project revealed that the brown adhesive was a modern epoxy glue, rather than a traditional material. The conservators felt that this information supported a continued technical study, with the authenticity of the sculpture in serious jeopardy.

CT Scan

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The object was taken to a local hospital, where doctors had graciously agreed to CT scan the object gratis; this imaging technique would allow the conservators to better understand how many fragments

composed the piece. Additionally, CT scanning would reveal interesting information about the density of the clay material and the aggregate present within the walls of the piece.

CT scanning refers to a process that exposes objects, or people, to x-rays that rotate around the body. Multiple detectors are present in the machine, allowing for the creation of sophisticated imagery that reveals areas of greater and lesser density (e.g. less dense areas are more "radio-transparent.") (As with the other analytical techniques discussed in this case study, many references can be found with information about how CT Scanning is conducted and the technology behind it. For information on its use in the study of works of art, see Ghysels, 2005.)

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The CT scanned images clearly showed the many fragments that composed the entire object, as well as the heterogeneity of the texture of the clay body, visible as a mottled pattern along the cross-section, where the denser aggregate appears whiter. The most surprising result of the imaging, however, was the discovery of a small, square fragment in the center of the object's back. This fragment was clearly visible in the surface images, which record the topography of the object's exterior surfaces. After examining the cross-sectional images, it became evident that this square fragment was composed of a finer clay body and was somewhat thinner than the rest of the pieces that composed the object.

TL Dating

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This unexpected observation led to another review of the previous TL dating results; as mentioned above, these results suggested that the piece was manufactured about 2000 before present. TL dating, as with FTIR, requires that a small amount of original material be removed from the object; although no original documentation was provided, the original sample site was likely to have been a hole about ¼ inch in diameter, present in the small, square fragment. Given the composite nature of the piece, and the unusual characteristics of the square fragment, the conservators felt that additional TL samples should be removed and tested.

TL dating is based on the principal that certain minerals, such as those present within a clay body, contain within their crystalline structure electrons which are able to move into certain locations upon exposure to specific amounts of energy. This energy may originate from radioactive minerals present in burial soil, or perhaps within the object itself, for instance, radon. Exposure to high levels of energy, such as during firing, "resets" these electrons, and they in turn release energy as they settle into less energetic states. After firing, as ceramic objects are buried in the ground over time, those electrons move back into these higher energetic states and become "trapped" there. Thermo-luminescence involves heating samples to release this energy, thus resetting the crystalline structure one more; the amount of energy released corresponds to the amount of radiation the object was exposed to over time, since it was last heated to a high degree. Once quantified, an approximate manufacturing date can be determined. (A useful discussion of this phenomenon can be found in Rasmussen, 2008).

It is important to note that, like all means of analysis, this technique has drawbacks. For instance, if an object was damaged in a catastrophic fire, the date obtained would only go back to this event. Further, intentional exposure to radiation, for instance from other imaging techniques, might interfere with the results. An important point directly related to this case study, TL testing executed on objects composed of multiple sherds will clearly only yield results for that specific fragment.

Five sites were sampled, including the small square fragment. Of the group, only the sample removed from the square fragment yielded ancient manufacturing dates. The rest were consistent with a production within the past 100 years.

Interpretation and Conclusion

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The study revealed that this object was not an authentic Nok sculpture, but rather a mostly contemporary sculpture with one ancient fragment. While it was virtually impossible to sample and TL test all the fragments composed within, the similarity in clay body supports a modern dating for all but that the unique, ancient component.

The work further underscores the need for more research into the history of Nok ceramic sculpture. A more extensive study of objects thought to be "good" would greatly aid those looking to authenticate similar sculptures in the future. Finally, the technical analyses undertaken during the project were ultimately integral to a more accurate identification of the object, and also helped to remove a potentially misleading example of a fascinating, ancient culture.

Glossary

Grog: Previously fired ceramic material, crushed and incorporated into wet clay to stiffen and add body to the new medium.
Pastiche: The use of pre-existing parts or components of one work of art to create a new object. The term does not necessarily connote deception, for instance, the creation of a whole work of art to satisfy certain demands in the art market.
Provenance: The place of origin, for instance the excavation find site, of an object/work of art.
Sherds: Fragments of an object, or vessel, that was once whole.
Slip: A thin suspension of fine clay particles in water.
Terracotta: A highly porous ceramic ware, which usually requires to around around 1000◦C.

Bibliography and Further Reading

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[i] See Gert, 2007, and Rupp, et al., 2005, page 283.
[ii] Fagg, 1994, page 80.