

# The Potential and Pitfalls of Large Multi-Source Collections

## Insights from the Analysis of Mimbres Gender Imagery

Michelle Hegmon, James R. McGrath, and Marit K. Munson

Archaeologists today are able to access vast quantities of information with an ease unimaginable a few decades ago. A few clicks bring together material assembled by our own projects, by our colleagues and students, and by people from other times and across the globe. Of course this potential also incurs challenges, as data gathered and

recorded in different ways are combined. Ongoing research (e.g., Spielmann and Kintigh 2011) is developing techniques for integrating data collected with different recording and metadata standards. This article takes on a different kind of challenge, involving the analysis of material assembled in various ways, some from systematic archaeological

### ABSTRACT

Archaeologists' newfound ability to access vast digital collections creates opportunities but also presents challenges when those collections are from varied sources, including public institutions and private collectors. We illustrate these challenges by comparing two analyses of gender in Mimbres pottery images. Both analyses used the same procedures, but one included material in private collections, while the second drew on a smaller but more controlled sample. Gender distinctions and division of labor were revealed by the first analysis, but the results were not duplicated in the reanalysis using the controlled sample. We consider reasons for the difference, addressing how collectors' interests may skew collections and suggesting that some particularly desirable Mimbres pottery designs were created using modern paint. The article concludes with recommendations for how archaeologists can best use mixed collections. These include considering how collections might be skewed and designing analyses to counterbalance likely issues, more chemical analyses with representative samples to gauge the extent of modern manipulation of Mimbres vessels, collecting data on the *provenance* (i.e., collection history) of material in order to try to trace the likelihood of post-excavation modifications, and studying the process of collecting as a means of understanding the authenticity of artifacts.

La recién adquirida habilidad de los arqueólogos de acceder a vastas colecciones digitales crea oportunidades pero también presenta desafíos cuando esas colecciones provienen de diversas fuentes, incluyendo instituciones públicas y coleccionistas privados. Ilustramos estos cambios por medio de la comparación de dos análisis de género en imágenes de la cerámica mimbres. Ambos análisis usaron los mismos procedimientos, pero uno incluyó material de una colección privada, en tanto que el segundo se basó en una muestra de material más pequeña pero mejor controlada. El primer análisis detectó distinciones de género y división de trabajo, pero estos resultados no fueron replicados por el reanálisis que usó la muestra controlada. Consideramos las razones que explican esta diferencia, proponiendo que los intereses de los coleccionistas pueden distorsionar la obtención de las colecciones. Sugerimos que algunos diseños particularmente deseables en la cerámica mimbres fueron creados usando pintura moderna. El artículo concluye con algunas recomendaciones para un mejor uso de las colecciones mezcladas por parte de los arqueólogos. Estas incluyen considerar los posibles sesgos o distorsiones existentes en colecciones y como diseñar análisis para contrarrestar probables problemas; implementar más análisis químicos con muestras representativas para evaluar la extensión de la manipulación moderna de las vasijas mimbres; reunir datos sobre la *procedencia* del material (es decir, la historia de las colecciones) para tratar de rastrear la probabilidad de modificaciones post-excavación; y estudiar los procesos de coleccionar como una manera de evaluar la autenticidad de los artefactos.

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excavations, some by art museums, and others by private collectors.

The inspiration and starting point for this article is a comparison between two identical analyses applied to different but overlapping collections of data from Mimbres painted pottery. One collection included material in private collections, some of which was probably looted; the second collection was smaller but included only well-provenienced excavated material. The analysis of the second collection produced less definitive results than the first. After describing the pair of analyses, we consider reasons for the different results including bias introduced by collectors and “embellishment” that creates fake designs. The conclusions explore implications for both the study of Mimbres pottery and archaeology in general.

## COLLECTIONS AND DATABASES OF MIMBRES POTTERY

The Mimbres archaeological culture known from southwest New Mexico is renowned for its spectacular painted pottery (Brody 2004; Hegmon 2002; Nelson and Hegmon 2010). Especially during the Classic period (ca. A.D. 1000–1130) many of the designs painted on bowls are representational, depicting animals and sometimes humans. These representational designs are unlike anything else made in the Southwest at the time, and they have attracted considerable attention from archaeologists, art historians, museums, and private collectors. Many sites were looted to supply the lucrative art market, and in the 1970s Steven LeBlanc established the Mimbres Foundation to protect and study what was left (LeBlanc 1983).

As part of the Mimbres Foundation work, LeBlanc and others traveled to many collections, public and private, photographing and recording data on the pottery. The resultant collection came to be known as the Mimbres Archive or Mimbres Photo Archive, and it included data on about 6,500 vessels. LeBlanc provided a physical copy (slides, negatives, and hard copy notes) to the Maxwell Museum of the University of New Mexico, where it was used by many researchers.

Beginning around 2003, LeBlanc and Hegmon collaborated to assemble a larger digital collection that came to be called the Mimbres Pottery Images Digital Database (MimPIDD). MimPIDD incorporates material from the Mimbres Archive and numerous other collections, and it now contains information on more than 10,500 painted Mimbres vessels. MimPIDD is part of the Digital Archaeological Record (tDAR.org), which is responsible for its long-term storage and preservation. MimPIDD can be accessed here: <https://core.tdar.org/collection/22070>.

## ETHICAL ISSUES

Both the Mimbres Photo Archive and MimPIDD include many vessels that are in private collections. In many cases, nothing is known about the collections or the current whereabouts of the pottery; all that is known about these pieces is what is in the database. This is invaluable information, but whether and how it can be used is a difficult question.

The Society for American Archaeology's (SAA) eight Principles of Archaeological Ethics (<http://www.saa.org/AbouttheSociety/PrinciplesofArchaeologicalEthics/tabid/203/Default.aspx>) read carefully on and around the issue of privately owned collections (see Pitblado 2014). On the one hand (Principle 1), “it is the responsibility of all archaeologists to work for the long-term conservation and protection of the archaeological record,” and *collections are part of that record* (italics ours). Also, (Principle 4) “archaeologists should reach out to . . . others interested in the archaeological record” and *many collectors have such an interest*. On the other hand (Principle 3), buying and selling objects, such as those in collections, contributes to the destruction of the archaeological record:

Archaeologists should therefore carefully weigh the benefits to scholarship of a project against the costs of potentially enhancing the commercial value of archaeological objects. Whenever possible they should discourage, and should themselves avoid, activities that enhance the commercial value of archaeological objects, especially objects that are not curated in public institutions, or readily available for scientific study, public interpretation, and display.

In other words, there are no absolute rules regarding material in private collections. Pitblado (2014) recently entreated archaeologists to work with responsible collectors. She is also currently heading an SAA task force to define relationships among professional archaeologists, avocational archaeologists, and responsible artifact collectors. It is charged with developing both a statement and a list of action items to advance the recommendations in that statement (Pitblado 2016). Pitblado's own research focuses on Paleoindian material, which includes many surface finds that can be collected legally on private land, and she describes how much of what is known about Clovis is due to private collections and the involvement of collectors. Shott (2017) similarly argues for the importance of considering private collections of projectile points in archaeological analyses. In contrast to these examples, virtually all Mimbres pottery is found in subsurface contexts, often in burials; thus, its collection involves excavation and destruction. Still, there are private collectors who own Mimbres pottery because they appreciate its beauty rather because of its commercial value. Alienating collectors is not productive, and may itself be unethical (Principle 4), as Pitblado notes.

MimPIDD takes a conservative stance with regard to private collections, in part following the lead of J. J. Brody, whose *Mimbres Painted Pottery* (1977) included illustrations of material in private collections. In the preface of his revised edition (2004) Brody explained why he was changing that practice:

The 1977 edition . . . contributed . . . to the rising market value of Mimbres painted pots, in that a monetary premium was placed on privately owned vessels that were pictured in it. Furthermore, implicitly and in some cases erroneously, my book certified them all as authentic, and they all became desirable trophies. . . . Looting follows the money, some collectors are greedy, even more are naïve, and the most destructive looting of archaeological sites everywhere in the world is a direct response to an art marketplace that is

childishly easy to manipulate. Rather than directly contribute again to an inherently destructive antiquities market, I have used in this edition, with a few necessary and carefully screened exceptions, only Mimbres paintings that are in publically owned collections, presumably insulated from the market place [2004:xvi].

There are two levels of access to MimPIDD. The Public Collection includes information on 2,472 vessels housed in public institutions that have given their permission. Anyone can view this version, which includes thumbnail photos and basic data. The Research Collection includes information on all vessels in MimPIDD and almost all data except some sensitive information such as UTM coordinates. Persons who wish to access this version must prepare a brief application in which they agree to follow ethical principles, including not publishing images of any privately owned material; the application process and ethical principles are detailed here: <http://core.tdar.org/document/381421/ethics-and-permission-to-access-mimpidd>.

We, the authors of the present article, adhere to these standards and we urge others to do so. At the same time, we recognize that there is valuable information in private collections, which are part of the MimPIDD Research Collection. This article is, in part, an exploration of how those collections can best be used. As the next section explains, the need for such an exploration became clear when we saw how interpretations of the data based on the private collections might be skewed.

## ALARM BELLS: NON-REPLICABLE RESULTS

For many laboratory analyses, including some such as carbon dating and bone chemistry routinely used by archaeologists, replicability is the gold standard. If two laboratories do the same analysis, they should produce the same results. Replicability is not often discussed with regard to the analysis of archaeological collections, although archaeologists probably assume that their collections are sufficiently representative that similar analyses of two collections of similar material will produce similar results, and many statistical techniques are applied to test this assumption. The work reported here involves a case in which this assumption was unfounded. Two identical analyses of two overlapping collections of Mimbres pottery produced quite different results.

### Setting the Stage

The Maxwell Museum's copy of the Mimbres Photo Archive was used by many researchers, including Marit Munson. Munson's research (published in 2000; see also Munson and Hays-Gilpin 2010) explored issues of gender and status as represented in the Mimbres paintings. She presented a multistaged analysis (described in more detail below) that allowed her to identify several gender-specific activities.

Hegmon teaches Southwest archaeology and often used Munson's article as an example of clearly presented analysis. McGrath was an undergraduate student in one of those classes.

As an exercise to learn about research analysis, he duplicated Munson's procedures and applied them to part of the MimPIDD dataset, using only vessels with at least site-level provenience that are housed in public institutions. McGrath found fewer markers of gender and fewer gendered activities, and his overall results did not support Munson's conclusion about the clear division of labor. This article explores the reasons for these different results and their broader implications.

### The Two Analyses

The analyses, done by Munson and then duplicated by McGrath, used identical procedures but were applied to different datasets. They involved a multistep process of identifying sex, gender markers, and then activities. Here we explain each step and the different results reached in each case; the details are summarized in Table 1.

**Databases.** Munson considered all bowls in the Mimbres Photo Archive (ca. 6,500), including those professionally excavated and those with no provenience in private collections. McGrath drew on the larger MimPIDD collection but considered only bowls with at least site-level provenience owned by public institutions. Currently (September 2016), MimPIDD has more than 10,500 bowls and 3,776 fit McGrath's criteria. There is some overlap between the two samples in that the professionally excavated bowls in Munson's sample would also have been in McGrath's sample.

Munson found 170 bowls (2.6 percent of her sample) that depict humans, for a total of 326 human individuals (2000:130). McGrath found 104 (2.7 percent) bowls depicting humans for a total of 139 human individuals. Neither author discussed chronological control, but since representational designs in general and depictions of humans in particular are most often found on what is called Style III pottery associated with the Classic period (Shafer and Brewington 1995), both analyses likely included the same chronological period.

**Sex.** The depictions of some individuals included sexually explicit genitalia, breasts, or beards. Munson found that sex could be determined for 123 (38 percent) of the depicted individuals in her sample, including 78 males and 45 females, for a male:female ratio of 1.7. McGrath could determine sex for 43 (31 percent) of the depicted individuals in his sample, 32 males and 11 females, for a ratio of 2.9. The difference in the frequencies of sexed individuals is statistically significant ( $\chi^2 = 25.98, p < .05$ ), although the difference in the sex ratios is not.

**Gender Markers.** The next step was to examine the sexed individuals to identify gendered traits. Munson identified a series of traits that might be gender-specific and found 440 instances of them, including 177 on sexed individuals. Four were associated primarily or exclusively with males (eye masks, hair knots, plaited hair, and head feather) and three were associated with females (string apron, head band, and leggings). For example, MimPIDD 2104 (Figure 1) shows two males, each with a horizontal stripe across the eyes, which Munson called an eye mask. She used these results to identify a total of 136 men and 68 women, as well as 12 individuals who had traits of both genders. McGrath's analysis with the smaller more controlled sample found 187

**TABLE 1.** Summary and Comparison of the Two Analyses Done by Munson and McGrath.

	Munson	McGrath
Nature of the collection	Mixed: Entire Mimbres Archive	Controlled: Only material in public institutions with at least site-level provenience
Sample size	$N \approx 6500$	$N = 3776$
N bowls depicting humans	170, 2.6%	104, 2.7%
N depictions of individual humans	326	139
Average depictions of humans per bowl	1.9	1.3
Sexually identifiable individuals	123, 38%	43, 31%
Male:Female	78:45 = 1.7	32:11 = 2.9
N possible gendered attributes	440	187
Attributes indicative of gender	<u>Male</u> : eye mask, hair knot, plaited hair, head feather <u>Female</u> : string apron, head band, leggings	<u>Male</u> : eye mask, hair knot, head feather <u>Female</u> : string apron
Individuals with gender markers	216, 66%	73, 52%
Man:Woman:Mixed % mix	136:68:12 5.6%	50:21:2 2.7%



**FIGURE 1.** MimPIDD 2104 from Swarts Ruin. Note that the human figures are anatomically male and they wear eye masks, thought to be associated with men. © President and Fellows of Harvard College, Peabody Museum of Archaeology and Ethnology, PM# 24-15-10/94502 (digital file# 99090022).

instances of these gendered traits, 56 on sexed individuals. He found support for only some of the gender-specific traits identified by Munson (eye mask, hair knot, and head feather on males, string apron on females). McGrath identified a total of 50 men, 21 women, and two individuals with traits of both genders. The difference in the gender ratios and the different frequencies of individuals with mixed gender traits are not statistically significant.

*Gendered Activities.* Finally, both analyses considered the activities of the gendered individuals they identified, which Munson called “gendered roles and statuses” (2000:134). She found a consistent association of certain activities and tasks with gender, “with men more often hunting or involved in ceremonies and women predominately responsible for child care. Women are also depicted carrying burdens with greater frequency than men” (2000: 138). In contrast, McGrath found a less clear division of labor. While he found that men were associated with hunting and ceremonies, his sample revealed no clear association of women with any particular activities.

For example, MimPIDD 2781 (Figure 2) shows a figure that can be identified as a man because he wears an eye mask, and he is depicted as carrying something, possibly a person or large animal. Munson had concluded that carrying was primarily a woman’s activity, although McGrath was not able to duplicate that result. The well-known cover of *Engendering Archaeology* (Gero and Conkey 1991) shows a Mimbres bowl that depicts a pregnant woman carrying a pronghorn. That bowl (MimPIDD 3898) is in the collection of the Western Colorado Museum, but unfortunately its provenience and excavation/collection history are unknown, so it was not included in McGrath’s analysis. It is depicted as Figure 5 in Munson (2000:136).





**FIGURE 2.** MimPIDD 2781 from the Galaz Ruin. The sex of this figure is not obvious, but because of the eye mask it is classified as a man. Mimbres bowl, earthenware with slip and pigments,  $3\frac{3}{4} \times 8\frac{1}{4}$  in. Collection of the Frederick R. Weisman Art Museum at the University of Minnesota, Minneapolis. Transfer from Department of Anthropology. 1992.22.169.

*Summary.* Individually, the differences found in each stage of the analyses are fairly minor and few are statistically significant. There is, however, a consistent trend in the nature of the difference, demonstrated by the summary data in [Table 1](#). Of the bowls that depict humans, those in Munson's sample have more individuals and those individuals more frequently (38 percent vs. 31 percent) have sexually explicit characteristics. There are more gender-specific attributes in Munson's sample. As a result, a larger percentage (66 vs. 52) of individuals in Munson's sample are gendered and a larger percentage (5.6 vs. 2.7) have a mix of gendered attributes. Finally, there is a more clear division of labor in Munson's sample, a division that conforms to both cross-cultural patterns and many contemporary expectations.

Although not definitive, these results are suggestive of sample bias. Munson's sample included everything in the Mimbres Photo Archive, including unprovenienced material in private collections, while McGrath's was more controlled. It is likely that the latter is more representative of the overall universe of Mimbres bowls, and our conclusion that there are differences between the samples is not surprising. More interesting is the nature—and directionality—of those differences and the way they might affect archaeological interpretations.

## INVESTIGATING THE DIFFERENT RESULTS

Several factors might have contributed to the different results obtained by analyzing the two different collections. Here we list those factors, what is known about them, and how they might have influenced the disparate results.

### Collection Sources

The collections analyzed by Munson and by McGrath included material gathered for different purposes and in different ways, and it would be surprising if they are not different. Munson's sample included material excavated systematically by archaeologists, as well as various private collections assembled in unknown ways that almost certainly included looting. McGrath's sample included only material excavated systematically and housed in public institutions. Here we explore the nature of those differences by comparing decorated bowls in two subsets of MimPIDD. Called the *Controlled* and *Uncontrolled* samples, these were selected to emphasize differences between different kinds of collections. Whereas there was some overlap between

**TABLE 2.** Occurrence of Representational Designs in the Controlled and Uncontrolled Samples, Including Only Classic-Period Bowls.

	Clear representational designs	Clear geometric designs	Total clear designs
Controlled	656 (32%)	1,370 (68%)	2,026
Uncontrolled	1,330 (49%)	1,373 (51%)	2,703

$$\chi^2 = 134.6, p < .05$$

Munson's and McGrath's samples, the two samples considered here are entirely different.

The *Controlled Sample* includes material excavated from known documented contexts and housed in public institutions. Because it includes only documented contexts, it is smaller and even more controlled than McGrath's sample, which included bowls for which there was only site-level provenience. Specifically, the controlled sample includes material from the following sites: Cameron Creek (Bradfield 1931), Galaz (Anyon and LeBlanc 1984), Mattocks (Gilman and LeBlanc 2016), Swarts (Cosgrove and Cosgrove 1932), NAN Ranch (Shafer 2003), Saige-McFarland (Lekson 1990), and Wind Mountain (Woosley and McIntyre 1996). Some of these were excavated carefully over the course of several years; others were salvaged with archaeologists literally working in front of bulldozers. Research goals included understanding the site, its architecture, and its occupational history, and excavations produced pottery from all kinds of contexts. Some of the vessels were restored, and it is possible that paint was enhanced as part of the restoration; however, it is unlikely that restoration involved "embellishing" the designs or creating entirely new designs (the distinction between restoration and embellishment is discussed further below). Thus the controlled sample is assumed to be generally representative of Mimbres pottery overall and to include only authentic designs.

The *Uncontrolled Sample* includes vessels with no provenience information for which the owner is either unknown or is listed as "private;" many of these were probably looted. Such collections were included in Munson's analysis. Private collections were probably assembled in various ways. Some collectors might have been eager to obtain any and all Mimbres vessels, others might have wanted one of each kind of design, and others might have wanted only the best or the most interesting. Given that the Mimbres tradition is famous for its engaging representational designs, it is likely that these were specially sought by some—perhaps most—collectors. It is also likely that some of the designs were modified to increase their visual appeal for collectors and are therefore not authentic.

In order to examine differences between the two samples, the relative frequency of different kinds of designs is shown in Tables 2 and 3. Only bowls associated with the Classic period (with Style II/III or Style III designs) are included in these tallies. As expected, representational designs, particularly those that include humans, are significantly more common in the uncontrolled sample.

**TABLE 3.** Occurrence of Designs that Depict Humans in the Controlled and Uncontrolled Samples, Including Only Classic-Period Bowls.

	Clear representational designs	that depict humans	that do not depict humans
Controlled	656	49 (7%)	607 (93%)
Uncontrolled	1,330	166 (12%)	1,164 (88%)

$$\chi^2 = 11.43, p < .05$$

The results of this comparison between the controlled and uncontrolled samples should serve as a sort of warning for research involving mixed collections. However, the comparison does not fully explain the differences between Munson's and McGrath's results, since their analyses focused primarily on the association of various attributes, rather than the overall frequency of those attributes. That is, having more or fewer representational designs should not affect the association of string aprons with females or hunting with men, if those associations are in fact consistent. Other factors must be at work.

### "Embellished" Images: Faking Mimbres Designs

A recent volume (Lazrus and Barker 2012) considers the impact of looting on archaeologists' knowledge of the past. Their emphasis is on the Old World, though they also discuss the issue in North America. Most researchers who work with Mimbres pottery are aware of some designs that do not look quite right. However, lacking the kinds of authentication techniques used by art historians, most are also reluctant to put these impressions in print, both because of a lack of certainty and because, as Brody remarks, "in a litigious society it is unwise to publically call anything "fake" without technical evidence" (2004:xvi).

One important study done in the field of museum conservation provides such technical evidence (Lee and Khandekar 2012). Their work, done in consultation with Mimbres expert Steven LeBlanc, was prompted by the speculation that "due to the current market value of Classic Mimbres vessels, a large number of authentic vessels have had their original design modified by transforming a simple central element to a more complex figurative design, resulting in a value increase of one to two orders of magnitude" (2012:218). Indeed, at least one Mimbres archaeologist has been told that bowls with "blank" interiors (i.e., with framing lines around the bowl's rim but no marks in the center) are worth a considerable sum because they can be modified by adding new designs. Lee and Khandekar looked for such modification using a technique called pyrolysis-gas chromatography-mass spectrometry, which can detect modern synthetic paint on Mimbres bowls. They studied 25 bowls, five from the Princeton Art Museum and 20 from private collections. The bowls all had designs that appeared, stylistically, to be genuine; however, the bowls' history, what art historians call "provenience," was unknown. These bowls were chosen because they were good candidates for having been modified and thus were useful for Lee

and Khandekar's research; the sample was not intended to be representative of Mimbres pottery overall.

Lee and Khandekar (2012) discuss what they call "restoration" and "embellishment" although they acknowledge that the distinction is not always clear. Restoration might involve reattaching broken fragments as well as "inpainting" to revive faded images, although restoration is not intended to manipulate designs. Embellished, in contrast, "is used to describe bowls that have had the original imagery manipulated in a deceptive manner" (2012: 219). All 25 bowls they studied were thought to be authentic Mimbres pieces, with at least some authentic designs. The question they asked is whether the designs had been embellished with modern paint. Answering this question involved taking and testing many samples of paint from each bowl, and they specifically focused on possibly suspect designs, including paintings of humans. They concluded that, of the 25 bowls they studied, more than half were possible fakes; seven had "embellished" designs and six more had "questionable" designs.

## Replicating Mistakes

The problem of unprovenanced and sometimes fake artifacts is, sadly, well-known in classical archaeology. The Brooklyn Museum recently designed an exhibit intended to reveal that about one-third of its collection of Coptic sculptures is fake (German 2012). These artifacts are the basis of what German calls the "invention" of Minoan and Mycenaean religion in which the conclusions of early scholars, based on illegitimate collections, were reproduced in later works. There are even suggestions that the invented history might have influenced later fakes, which reproduced and falsely legitimized the invented history. While there is no reason to think that archaeologists' understanding of Mimbres culture is similarly tainted, there are suggestions that modified paintings may have falsely emphasized and thus effectively invented some aspects of Mimbres art.

One of the bowls analyzed by Lee and Khandekar (2012) is from a private collection and illustrated as their Figure 1 (MimPIDD 9330). It shows four human figures surrounding a table or blanket; they all wear head feathers and thus would be classed as men by both Munson and McGrath. Its configuration is similar to MimPIDD 1308, which was illustrated in Brody (1977:170, Figure 114). Lee and Khandekar focused analysis on these figures "because similar small human figures are known to have been embellished in other bowls on the market," and they indeed found modern paint in the figures (2012:222). Thus it is possible that whoever modified the painted design on this bowl had seen similar figures on other Mimbres bowls (bowls that themselves might or might not have themselves been modified) and copied them onto this one. It is also possible that the head feather was chosen because it is indicative of "Indians" in popular culture.

McGrath's analysis revealed one intriguing and problematic bowl (MimPIDD 10386) that unfortunately cannot be illustrated here because it is in a private collection. Fortunately, MimPIDD includes photos of this bowl before and after "restoration." It was a large fragment of about one half of a bowl that showed a human figure with arms from about the chest down. The figure wears leggings, which were found to be associated with women by Munson but not McGrath. The final restored and apparently

embellished bowl is whole and depicts an entire human, including head. That figure is wearing an eye mask, which was found to be associated with men. In other words, the embellishment of this figure may have (inadvertently) created a mixed gender figure.

## MOVING ON: HOW CAN ARCHAEOLOGISTS DEAL WITH MIXED COLLECTIONS?

The starting point for this article was the difference in results produced by identical analyses done on different but overlapping collections. Munson's analysis of a mixed collection found a clear gendered division of labor that conformed to both known cross-cultural patterns and contemporary stereotypes. McGrath's replication of that analysis applied to a smaller but more controlled collection found less clear patterns and a less clear division of labor. It is possible that the differences are simply a result of McGrath's smaller sample, a possibility that cannot be ruled out statistically. However, the special interest of collectors in Mimbres pottery with representational designs, the possibly widespread practice of embellishing the paintings on Mimbres bowls, and the likely focus on depictions of humans all suggest that the differences may have resulted from including bowls from biased private collections.

One simple but less than ideal solution is for archaeologists to study only perfectly controlled collections—material that was professionally excavated, has been properly curated, and is stored in public institutions. To do so, however, would exclude large collections, including an unknown amount of authentic material. It would also alienate us from well-intentioned collectors. Rather than advocating this somewhat drastic measure, we conclude with several ideas that might help archaeologists make better use of mixed collections, with implications for both Mimbres pottery and the field overall.

- (1) Munson's (2000) analysis is often cited and discussed in research on both Mimbres pottery and archaeological studies of gender. The results presented here partly support but partly question her original conclusions. Individuals depicted on Mimbres pottery do sometimes have clear sexual characteristics and these can be used to infer some gender-specific traits, as Munson concluded in 2000. However, McGrath's more controlled analysis, discussed here, found evidence for fewer gendered traits: an eye mask, hair knot, or head feather were indicative of men, while string aprons (but not leggings) were indicative of women. Furthermore, Munson's original conclusions regarding a clear sexual division of labor and status difference were only weakly supported by McGrath's more controlled analysis; he found just two activities, hunting and ceremonies, associated with men, and none associated primarily with women.
- (2) As Lee and Khandekar (2012) showed, detecting modern modifications of artifacts with technical means is a complex labor- and technology-intensive process. While it is unlikely that such analyses could be done on the thousands of unprovenanced Mimbres pots in various collections, a

targeted study might provide insights into the extent and nature of embellishment. That is, Lee and Khandekar (2012) chose a sample that was likely to have been embellished, but their techniques could also be applied to statistically representative samples. Results from such samples would give us some idea about the extent of modifications of different kinds of collections or designs. These results, in turn, could be useful regarding most of the following suggestions.

- (3) Anthropological archaeologists (at least in North America) rarely use the word “provenance” except sometimes as a synonym of provenience, meaning where an object was found in its archaeological context. In contrast, art historians and classical archaeologists commonly discuss the “provenance” of objects, by which they mean the record or history of ownership. An object’s provenance (in the art history sense) can provide insights into the likelihood that an object was embellished and thus can also be useful regarding the following suggestions. MimPIDD currently includes some anecdotal information about provenance, but plans are being made to add such information systematically.
- (4) Archaeologists sometimes assign a degree of confidence to assemblages found in different contexts. For example, material found on a room floor would be associated with the use of that room with a high degree of confidence, while material in the fill of that room might be classified as mixed and only weakly associated with the use of the room. Both assemblages could be usefully analyzed, but the results would be interpreted in different ways and with different degrees of confidence. If analyses of the floor and fill assemblages produce similar results, conclusions would be well supported. But if the results are different, those based on the high-confidence assemblage would be given the most weight. Similar procedures could be used with collections from different sources. If McGrath’s results had simply mirrored Munson’s, there would be no issue and no reason for us to write this article.
- (5) Archaeologists using various kinds of collections could consider specifically how those collections were assembled and how they might be biased and conduct analyses with those factors in mind. For example, an analysis of Mimbres geometric designs, which are of less interest to collectors and more difficult to modify while remaining within established patterns of symmetry, might safely include mixed collections. In contrast (and with hindsight), analyses of human depictions on Mimbres pottery should demand well-controlled samples. We have not examined Mimbres animal images in this research, but, given their potential appeal to collectors, we suggest that researchers working with any representational imagery should give careful consideration to sample bias.
- (6) Finally, the ways in which collections are assembled might also become a subject of study in its own right so that archaeologists can better understand the collections we analyze. The SAA task force that is working to define relationships among archaeologists and collectors is recommending this kind of work. Other fields, including museum and cultural studies, already sometimes study the process of collecting (e.g., Byrne et al. 2011; Pearce 1992). In the Mimbres case, if we find that collectors and embellishers target designs that depict humans with sexual characteristics or activity patterns that mirror contemporary attitudes, we could write about how the present is “found” and then reproduced in the past (see also Conkey with Williams 1991). This would help us understand

how best to deal with collections and would tell us something about the world today.

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## Data Availability Statement

The data on which this study is based are part of the Mimbres Pottery Images Digital Database (MimPIDD), part of the Digital Archaeological Record. MimPIDD can be accessed here: <https://core.tdar.org/collection/22070>.

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## AUTHOR INFORMATION

**Michelle Hegmon** ■ School of Human Evolution and Social Change, Arizona State University, Tempe, AZ 85287-2402, USA ([mhegmon@asu.edu](mailto:mhegmon@asu.edu)) (corresponding author).

**James R. McGrath** ■ Department of Anthropology, University of Iowa, 114 Macbride Hall, Iowa City, IA 52242, USA ([james-mcgrath@uiowa.edu](mailto:james-mcgrath@uiowa.edu))

**Marit K. Munson** ■ Department of Anthropology, Trent University, 1600 West Bank Dr., Peterborough, ON K9J 7B8, Canada ([maritmunson@trentu.ca](mailto:maritmunson@trentu.ca))