Arts & Humanities

Beauty by Numbers

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Art historians have been using statistical methods to classify ancient works since the 1970s, when computers were introduced to the field. By measuring the physical dimensions of clay pots and stoneware items whose origins are well established, for instance, scholars can identify the variables that link the pieces to specific cultures. That information, in turn, helps historians identify the provenance of newly discovered works.

This kind of quantitative approach is useful for studying simple objects like pottery, which can be characterized by a few variables, but it's not typically used to examine sculpture or visual art. How could you quantify, say, the subtle iconographic elements that distinguish an ancient Phoenician ivory carving from one produced in nearby North Syria?

Art historian Amy Gansell '98BC has done just that, and her solution involves one of the most sophisticated tricks of number crunching ever attempted in her field. As part of her Harvard dissertation, she recently scrutinized female figures depicted in hundreds of decorative ivories from first-millennial BCE Mesopotamia, recording the shapes of eyes, noses, and chins, whether hair is curly or if the women wear jewelry, and dozens of other details. Gansell then recruited Chris Wiggins, a Columbia associate professor of applied mathematics and applied physics, to examine the 32,000 resulting pieces of data. Wiggins employed a new, high-powered type of statistical analysis called "machine learning," which can reveal hidden patterns and associations amid huge data sets. (Biologists use machine learning to untangle the human genome, and political scientists use it to comb election results for voting trends.)

Gansell used the technology to brush off what had become a dusty topic for art historians, revealing previously unobserved differences in how Phoenician and North Syrian artisans plied their trade. She discovered that among ivory carvings whose female forms have well-defined eyelids and nostrils that are delicately scooped out (rather than drilled straight through), 95 percent are from North Syria, as determined by previous studies. "No one would have noticed the association between those variables and the North Syrian origin simply by looking at the carvings," says Gansell, who will defend her dissertation at Harvard this spring. "It provides one more tool for determining the provenance of ivories whose origins are unclear."

Joanna Smith, a Columbia art history professor who uses quantitative methods to study Bronze Age ceramics and wasn't involved in the study, says that Gansell's methodology could be influential, especially if she can convince other scholars that her findings advance their understanding of ancient aesthetics. Adds Gansell, "Some art historians, I suspect, will dismiss my approach because research in the field typically isn't data driven. But there's a drawback to relying solely on impressionistic visual analysis: You can end up with entrenched ideas about what a particular culture's art is supposed to look like. My methods can reveal new information, new ways of looking at these pieces."

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