

Metal composition hold key to identity of modern sculptures

30 July 2009

How do you tell when, where and how a Picasso or a Matisse sculpture was cast? Could bronze sculptures have their very own DNA?

By linking data from the alloy composition of modern sculptures with parameters from art history, Dr. Marcus Young from Northwestern University together with collaborators from the Art Institute of Chicago, have classified the unique composition profiles of cast bronze sculptures by major European artists of the first half of the 20th century, profiles which could be used as another method to identify, date and even authenticate sculptures. Their findings¹ are published online in Springer's journal, *Analytical & Bioanalytical Chemistry*.

Bronzes are copper alloys containing various amounts of tin, zinc and other metals whose presence alter the alloy's melting temperature, the strength and hardness of the sculpture, its resistance to corrosion, and its color and patination. The foundries of the early 20th century were quite secretive about the bronze composition they used to prevent other foundries from producing a superior product, suggesting that alloy composition may be sufficient to identify which foundry cast a particular sculpture. In addition, not all the sculptures carry a foundry mark or have documentary evidence to identify where and when they were cast. An in-depth knowledge of bronze composition is therefore important to the art historian and connoisseur studying 20th century sculpture and trying to address questions of authenticity, origin and artist intention.

Dr. Young used a form of optical emission spectroscopy (ICP - OES) to determine the metal composition of 62 modern bronze sculptures cast in Paris in the first half of the 20th century, from the collections of The Art Institute of Chicago and the Philadelphia Museum of Art. Included were sculptures by Matisse, Picasso, Renoir and Rodin, among other masters. This study is the first

comprehensive survey of the alloy composition of a large number of modern sculptures by many different artists and foundries, spanning a half century.

The researchers showed that the sculptures consist of copper, with zinc and tin as major alloying elements, varying over a broad range of compositions. They were able to group the sculptures into three distinct types: high-zinc brass*, low-zinc brass* and copper-tin [bronze](#). These three groups show good correlations with the artist, the foundry, the casting date and the casting method. For example, the high-zinc brass alloys correspond to most of the Picasso sculptures cast in lost-wax at the Valsuani foundry post World War II.

The authors conclude that "By expanding the ICP-OES database of objects studied, these material correlations may become useful for identifying, dating or possibly even authenticating other bronzes that do not bear foundry marks."

Source: Springer

APA citation: Metal composition hold key to identity of modern sculptures (2009, July 30) retrieved 4 December 2021 from <https://phys.org/news/2009-07-metal-composition-key-identity-modern.html>

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