

Science v the educated eye

## Is art-connoisseur yet another job threatened by technology?

*For the time being, science and specialists work best in tandem*



THE patient is carefully positioned on a pristine rectangular table. A signal is given, and from behind a glass wall, a technician directs an X-ray machine overhead. Zapping begins. This is not a hospital. It is the conservation laboratory of the Rijksmuseum in Amsterdam. Visits here were part of the museum's recent two-day symposium "Jewellery Matters", which broke ground by inviting artists, makers, scientists, educators and collectors as well as the usual art historians.

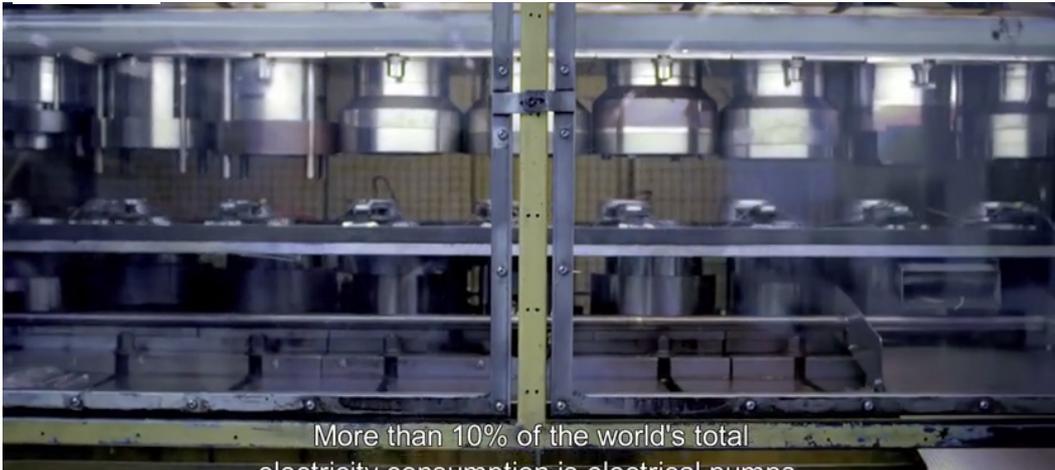
The patient was a fanciful 17th-century pendant having its enamel analysed in order to find the actual date of its creation. In the 19th century demand for such

pieces outstripped supply, and fakes (some magnificent) were produced to satisfy the market. Was this one of them?

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The same X-ray fluorescence spectroscopy (XRF) equipment could be used to study a 16th-century Indian bronze statue, a Roman glass vase or a leaf from a medieval illuminated manuscript. As one technician describes it, it works this way: A precisely targeted beam enters the object exciting the electrons through which it passes. A kind of dance follows during which they leap up before returning to their starting place. The

energy released is measured, and component materials and their proportions identified. Comparisons with the museum's database lead to the jewel's date. But not all museums use the same software. Standardisation would allow pooling of data across institutions, and efforts to promote this are underway.

XRF is just one of many high-tech techniques. Laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS), can date decorations on Qing dynasty ceramics. Here, a powerful laser vaporises a tiny amount of material which is then broken into ions. The different elements are sorted by their mass, and counted by a very fast mass spectrometer—the more counts, the more of the element is present. Carbon-14 dating, the best known of these tools, which uses the predictable decay of the radioactive carbon-14 isotope, can tell the age of Old Master wood panels. It and infrared reflectography were among the many technologies used during the intensive scrutiny of “Salvator Mundi”, which played a key role in the work’s re-attribution to Leonardo da Vinci—and its subsequent record-breaking auction price of \$450m.

That price and the media storm that followed demonstrated how important science has become to art history and to the market. For centuries, connoisseurs spent their lives handling objects, studying archives and inventories, chasing provenances and training their eyes to see what is instead of what they wish they were seeing in order to answer such questions as “Who made it?” and “When?” Now science can get answers faster and with more certainty. Who will want connoisseurs with their educated guesses? Yet another set of specialist skills seems about to be made redundant by technology.

This conclusion is reasonable—but premature. The connoisseur, which is to say the investigative, knowledgeable and imaginative curator, scholar, dealer or collector, has the insights and curiosity to ask questions about a work of art in the first place. In any case, even the most exciting technologies have limitations. The immutability of gold has thus far insulated it from such probing. Carbon-14 dating can only be used for organic materials. And according to Andrew Shortland, director of the Cranfield Forensic Institute (CFI), a laboratory that studies everything from ballistics to corpses, “unless you use radio-carbon [ie, carbon-14] dating, you cannot absolutely date an object.” Other procedures, like those mentioned above, result in some degree of error. Depending on such variables as software choice and size of databases, this can vary from a few years to a century or more.

Quick and clear solutions can come if an element found present in a piece was used only at a given time. “Chrome, a very stable compound, was discovered in 1797,” Mr Shortland notes. When he found it on a green leaf of a Meissen porcelain sculpture he analysed, he told the collector that it was not the prized early 18th-century piece

after all. But this client was a connoisseur, one whose knowledge the scientist esteemed. The collector was certain the piece was early and requested more tests. The other leaves contained no trace of chrome. The first one, therefore, was a later restoration. The collector was right, after all.

Importantly, the availability of technology is limited. The number of experts is small; the cost of equipment and staff to analyse output is high. Some big museums can afford high-tech laboratories of their own to analyse their collections. Private owners, dealers and auction houses must employ the few laboratories like CFI that do commercial work. Fees depend on the time involved. This means that except when sentiment outweighs prudence, customers are more likely to bring CFI a piece valued at £300,000 than one worth £3,000, even if the time needed is as little as a day. The use of artificial intelligence will no doubt provide more insight in future. Indeed, Robert Erdmann, chief scientist at the Rijksmuseum has started work on “21st Century Connoisseurship”, a Machine Learning project that seeks to bring together existing technologies in one “supertool”.

That the Rijksmuseum opened its lab for the “Jewellery Matters” symposium is a reflection of convictions of one of its keynote speakers, Robert van Langh, the museum’s head of conservation. A trained goldsmith with a combined PhD in materials science and art history, he believes that “in the pursuit of knowledge about works of art, the language of science and that of the humanities both have to be spoken,” or at least both “understood”. In other words, while the nature and interplay of the contributions of each may well change, the future belongs to a partnership of both technology and the connoisseur.

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