

Art Forgeries and Their Detection



Megan McHugh

Grace DiFrancesco

Joe Gencarelli

Cai Debenham

Table of Contents

● Introduction.....	Page 1
● History.....	Page 2
● Artist Forgers.....	Page 3
● Dealer Forgers.....	Page 4
● Examination.....	Page 5
● Carbon Dating.....	Page 6
● White Lead.....	Page 7
● X-Ray.....	Page 8
● Dendrochronology.....	Page 9
● Stable Isotope Analysis.....	Page 10
● Thermoluminescence.....	Page 11
● Craquelure.....	Page 12
● Digital Authentication.....	Page 13
● Morellian Analysis.....	Page 14
● Atomic Absorption.....	Page 15
Spectrophotometry.....	Page 16
● Inductively Coupled Plasma Mass Spectrometry.....	Page 17
● Wavelet Decomposition.....	Page 18

Table of Contents, cont.

● Photographic Forgery.....	Page 19
● Victorian Waifs.....	Page 20
● The Rospigliosi Cup.....	Page 21
● Etruscan Terracotta Warriors.....	Page 22
● Flower Portrait.....	Page 23
● Michelangelo's 'Cupid'.....	Page 24
● Samson Ceramics.....	Page 25
● Getty Kouros.....	Page 26
● Copying vs. Forging.....	Page 27
● Pastiche.....	Page 28
● Organizations Introduction.....	Page 30
● Association Research into Crimes against Art.....	Page 31
● Racketeer Influenced and Corrupt Organizations Act.....	Page 32
● Postal Fraud.....	Page 33
● Archaeological Forgery.....	Page 34
● Archaeoraptor.....	Page 35
● Neutron Activation Analysis.....	Page 36

History

For thousands of years, Artists have been sculpting and painting master pieces. Until these artworks acquired monetary value, forgeries weren't a problem, but once these pieces became more valuable, the number of forgeries began to rise. As forgeries became more common, new and improved methods of detection became necessary. Methods and techniques such as carbon dating, white lead testing, and x-ray scanning have been developed to determine the legitimacy of various works of art. Not only Paintings, but also archeological artifacts have been forged.

Portrait of a woman X-ray analysis revealed a paint present that wasn't invented until after the death of the artist, Francisco Goya.



Artist Forgers

There have been many forgeries throughout the years, and behind an art forgery is the forger. Han Van Meegeren sold his own paintings as if they were masterpieces from a well known artist named Jan Vermeer. To make his paintings seem more authentic, Meegeren baked his painting to obtain an old look, rolled it up to make it appear as if it were cracked formed over several years, and he even damaged it and restored it. Several other well known art forgers had similar ways to make their work appear like the original artist's. Among the most famous art forgers are Eric Hebborn, Tom Keating, and Elmyr de Hory.



The supper at Emmaus was believed to have been painted by Jan Vermeer, but in fact it was painted by Han Van Meegeren.

Dealers of Forges

Often times it is up to the art distributor to determine a work's legitimacy. When authenticity is found to be fraudulent a dealer may quietly remove the piece and either sell it back to the forger or discard it. While art dealers sometimes sell forged works unwittingly, it is not uncommon for a dealer to be a specific forger's distributor. What made dealer John Drewe successful, were the false provenances that he wove for his forger, John Myatt, in order to make false works appear authentic. He also sold pictures of forgeries to prominent art institutions. Overall Drewe made a profit of \$2,940,000, whereas Myatt made only \$165,000. However, the two were arrested and heavily fined for their crimes. In this case of forgery, it was the dealer who inspired the artist to resort to illegal activity in order to turn a greater profit.



John Drewe



John Myatt

Methods of Detection



There are two ways to determine if a piece of art is the real, or if it has been forged. The first way is by using a more subjective method known as Stylistic analysis. This form of authentication relies on the keen eyes of art historians who use their knowledge of the uniqueness and the progression of the artist's style to conclude whether a piece of art is authentic or not. The second method, Technical analysis, utilizes equipment such as microscopes to view the oxidized cracks of oil paintings, or the extra layers on ancient glasses. This technique is used to see if there are parts of the artwork that have been artificially induced.

Carbon Dating

Carbon dating is the use decaying nitrogen of radiocarbon, or Carbon 14, a common isotope, in order to determine a date around which a painting was made. The neutrons commonly produced in cosmic rays form this Carbon 14, and from that, scientists investigating the work of art and how old it is. The carbon has a life span, and after a certain point, it starts to decay at a constant rate, and because of its constant decrease in the presence of the radiocarbon, the age of some artwork could be determined by counting the number of remaining carbon 14. This technique is not relatively useful because it involves destroying a large amount of materials.



Did You Know?

- About half the amount of Carbon 14 would have decayed after about 5,730 years,

White Lead



The Disciples at Emmaus by Van Meegeren and the equation used to discover that it was a forgery.

$$\begin{aligned}\lambda_{y_0} &= 8.5 * 2^{\frac{y_0}{54}} - 0.8(2^{\frac{y_0}{54}} - 1) \\ \lambda_{y_0} &= 98050.0\end{aligned}$$

White lead dating is a method often used to find the age of an object up to 2000 years old. White lead first became widely used after it was discovered that the radio activity of a substance is directly proportional to the number of atoms present in a painting. Using chemical equations it is possible to calculate the amount of lead-210 and radium-226 in each work of art. Lead and radium are both elements contained in lead oxide, which is more often known as white lead. If the amount of white lead is too large then the painting is modern, and if it has almost reached radioactive equilibrium then the painting is much older.

X-ray

Earlier work can be detected underneath surfaces of paintings using a method of forensic authentication known as x-raying. A painting can be found to be not authentic if the image below the other image depicts more modern objects when the painting is claimed to have been completed in a different era. Often times an artist will reuse a canvas, which can also be detected by conventional x-ray because it determines if an object has been altered or repaired. One painting, *Portrait of a Woman*, was attributed to Goya. However, x-rays taken in 1954 found that there was another portrait underneath the original work. Diffraction was used to determine that zinc white paint was used in the lower painting, which was invented after Goya's death and therefore a fake.



Portrait of a Woman,
Attributed to Goya

Did You Know?

- There are two types of x-ray used in art forgery detection: diffraction and fluorescence.
- Diffraction is when the object bends the x-rays and is most useful in analyzing the different components in paint.
- Fluorescence is when the object is covered in radiation to cause it to emit x-rays and reveals information about the metals used in sculptures.

Dendrochronology

Dendrochronology is a scientific method known as tree-ring dating. The technique came into use during the early part of the 20th century and was discovered by A.E. Douglass from the university of Arizona. Knowing the age of a tree is important to art historians because it allows them to date the panel paintings and may indicate where the painting was done based on the type of wood. Panels are trimmed of the outer rings from the tree and usually only consists of a small radius of the trunk, so often only the earliest possible date can be determined for the actual arrival of a seasoned raw panel. This process can be used on any wooden object, but it may not be very useful because it is necessary for there to be about a hundred rings to determine the age accurately.



Eggcaetera by Pascal Oudet is not a forged piece of artwork and this can be verified through the use of dendrochronology.

Stable Isotope Analysis

In general, isotope analysis is used to examine the distribution of stable isotopes within chemical compounds. In art, stable isotope analysis is used to determine where marble used in a sculpture was quarried. Isotopes are in every living being due to a life of eating, drinking, and inhaling particles in other ways. When dead, all isotope processes cease and no longer accumulate in the being. However, the isotopes already within the body remain. Of course, marble is not a living being so this may seem like it doesn't relate to art. It actually does because marble sculptures outside have a surface patina which stable isotope analysis can be used on to determine if the artwork is from the time period it is claimed to

Did You Know?

- Stable isotopes are simply chemical isotopes that are not radioactive.
- Some stable isotopes are actually radioactive, but their half lives are too long to be measured.
- Isotopes themselves are part of one or possibly more atoms with the same atomic number, but a different number of neutrons.

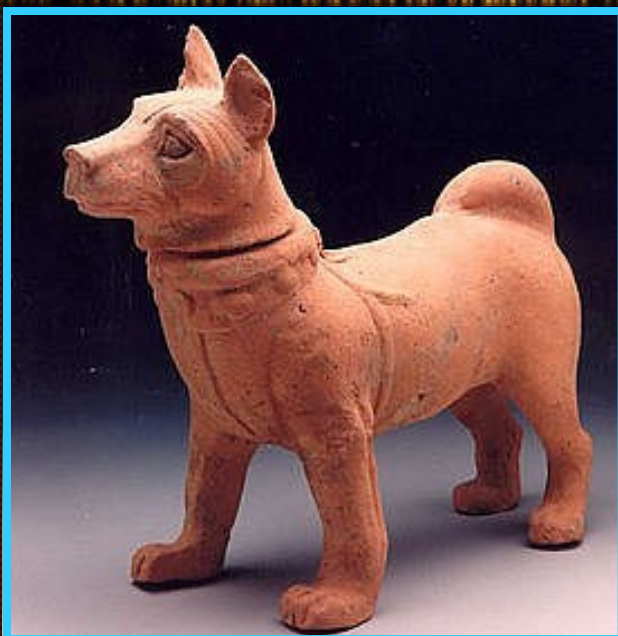
Thermoluminescence

The technique known as thermoluminescence is used to detect pottery forgeries. The process is fairly easy to understand. Heat is applied to pottery and that causes it to produce thermoluminescence, which is just light. The older the piece of pottery, the more thermoluminescence it produces. In general the amount of luminescence is directly proportional to the original amount of radiation in an object. So any artwork that was claimed to have come from awhile ago could be subject to the testing if there had been it had been exposed to any radiation previously.

be made.

Did You Know?

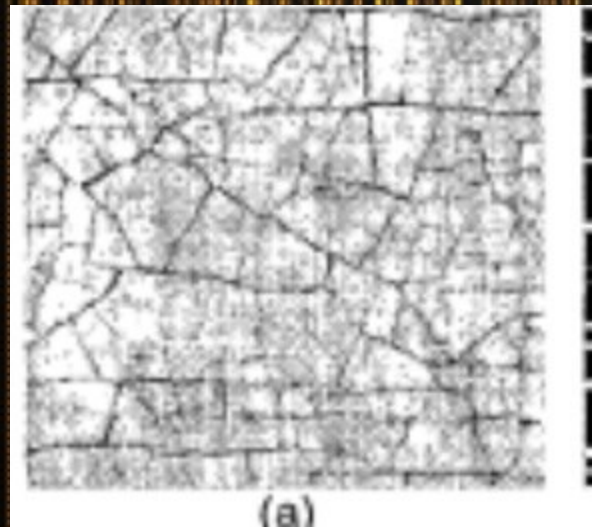
- The formula used to determine the age of an object is the subsequently accumulated does of ambient radia-



A Chinese burial guard dog that was certified by Dr. M.Y. Tso of Hong Kong Univeristy to be from the Han Dynasty and about 1868 years old.

Craquelure

As paintings age they develop unique crack formations known as craquelure. While this is a sign of damage to the work, it can also be used in authentication. Should a piece lack a distinctive marking from the art it mimics, it is easy to identify as fraudulent. There are a number of computer algorithms that make craquelure verification easier and faster. One program can be used to map out the cracks and another can compare it to the original work. The problem with this method is that as the artwork ages, its patterns change. Additionally, when a painting is restored, the more distinct fissures are often covered up.



Digital Authentication

A new method that was recently introduced in detecting art forgeries is known as digital authentication. Paintings are converted into digital images where this process is then applied to them. The digital picture is then broken down into more basic images by wavelet decomposition. This broken down images are called sub-bands. A frequency is then assigned to each sub-band to determine the textures in the image. Broad strokes would have a low frequency, while fine strokes would have a high frequency. This method is becoming used increasingly more often. It was used on thirteen drawings attributed to Pieter Brueghel the Elder and revealed that five of them were actually imitations.

Virgin and Child with Saints was attributed to Pietro Perugino, but by using wavelet decomposition it was discovered that at least four different artists worked on the picture.



Morellian Analysis

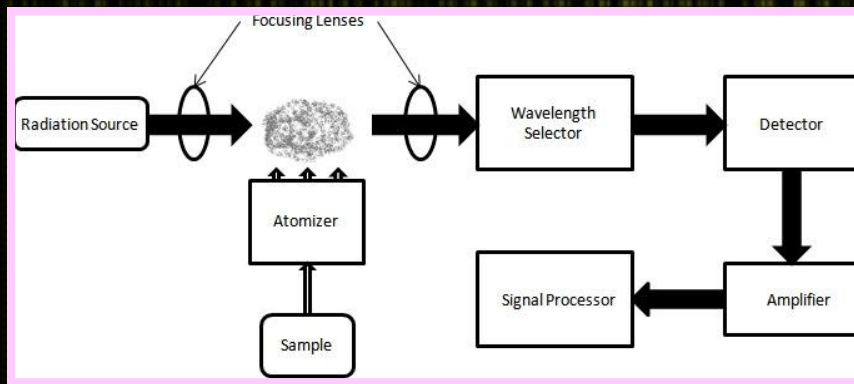
Developed by Giovanni Morelli, Morellian analysis focuses on verifying a work through the author's unique quirks, or idiosyncrasies. Morelli noted that as an artist gains experience he or she develops particular, figure based formulas for figures that are maintained throughout the rest of his or her career. These can then be identified, mapped out, and predicted in future art. In this manner, works can be analyzed as if they were fingerprints. The details of focus can range from the minute details of eyes, to the broad strokes of skies.



Bust of Giovanni Morelli

Most authentications will include a Morellian Analysis to complete verification. However, unlike other methods of investigation, this approach relies heavily on the skill of the inspector and does not make use of computer algorithms. Despite this, a capable scholar in Morellian Analysis can accurately determine the age, materials, and methods used to create a work with or without the use of special equipment. Regardless of the human element, Morellianism is considered a scientific field.

Atomic Absorption Spectrophotometry



Atomic Absorption Spectrophotometry block diagram.

During the 1950s a team of chemists, led by Sir Alan Walsh at the Commonwealth Scientific and Industrial Research Organization, Division of Chemical Physics, in Melbourne, Australia. Absorption spectrometry is used to find the concentration of an analyte in a sample. Like the inductively coupled plasma mass spectrometry process, this is often used in art forgeries to determine if there are any suspicious elements in the work that would make it so that it could not possibly have been made during the time period people claim it was.



Modern atomic absorption spectrometers.

Inductively Coupled Plasma Mass Spectrometry

Inductively coupled plasma mass spectrometry (ICP-MS) is a highly sensitive process that is used to determine the range of both metals and non-metals. It uses an inductively coupled plasma to produce ions. This type of plasma can make gas electrically conductive because it has enough ions and electrons. In spectrometry this plasma is produced and sustained in a torch that comprises three concentric tubes made of quartz. In this container the flow of the inductively coupled plasma is kept away from the walls of the torch as the gas pushes it away. The ions are extracted from the plasma in the mass spectrometry process and are separated on a basis of their mass-to-charge ratio. A detector receives an ion signal proportional to the concentration. The main use for ICP-MS in detecting art forgeries is to provide metal analysis on any sculptures that have been made from that material. Also this method is used to detect for anomalies in any paintings. If they find any elements present in the artwork that was not traditionally used during that time then the object cannot be authentic.



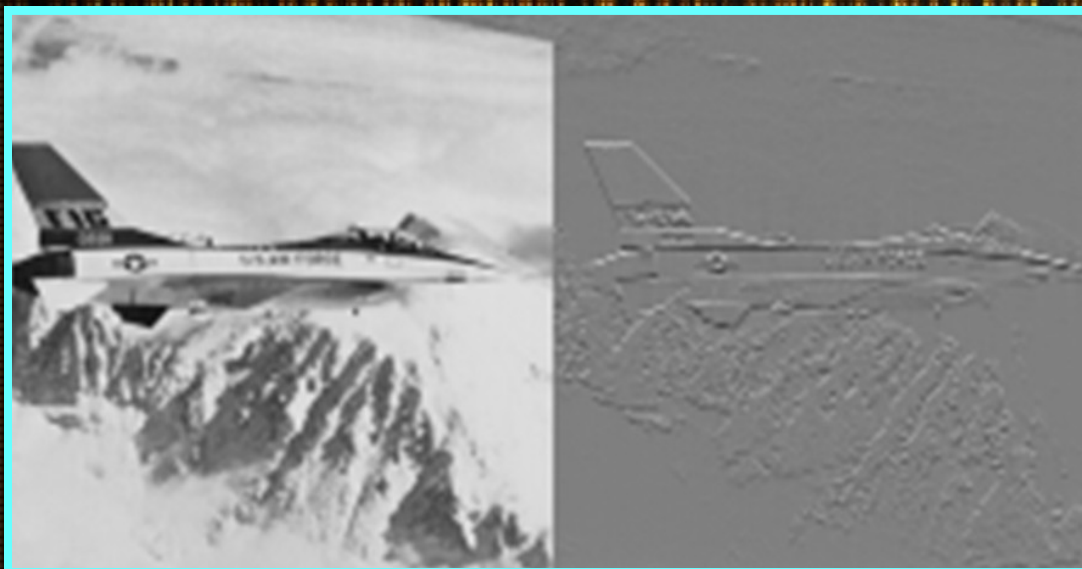
ICP-MS Instrument

Did You Know?

- Quartz is a silicate mineral that can be many different colors, or even colorless.
- In the Earth's continental crust it is the second most abundant mineral.
- The word "quartz" derived from the German "quarz", which is related to the older German word "twarc." In Polish "twardy" means hard.

Wavelet Decomposition

Wavelet decomposition studies can be performed on a work to a piece's authenticity through brushstroke size. The painting is analyzed in smaller portions known as sub-bands with each section possessing a certain frequency. Broader strokes, such as those in large sections of broad surfaces, will return lower frequencies. Thin strokes, such as those used to draw a forest of dead trees in the distance, will return higher frequencies. By comparing a questionable work to a known original it is possible to determine the piece's authenticity. For instance, the master's sub-bands may return long fluid strokes, whereas an imitator's work could be composed of smaller strokes overlaid so as to imitate the overall look of the original. A famous test of the wavelet decomposition method was the analysis of thirteen drawings accredited to Pieter Brughel the Elder. Of the thirteen, five were known forgeries. The experiment accurately identified these five works without condemning any of the authentic drawings.



Photographic Forgery

Photographic forgeries have become more popular over the past 50 years because of its rise in value. By using photographic processes used in the 1800s and 1900s, many forgers were able to make fake photos. To authenticate a photograph, the type of paper would be checked to see if it matches the printing paper that would have been used around the photographer's time. One method of identifying real or fake artwork is by using software made by Adobe. The software uses an algorithm that can detect certain geometrical patterns that form then a picture has been digitally altered.



The rendered spheres in the overlay reveal lighting differences in the digital photo, suggesting it is a forgery.

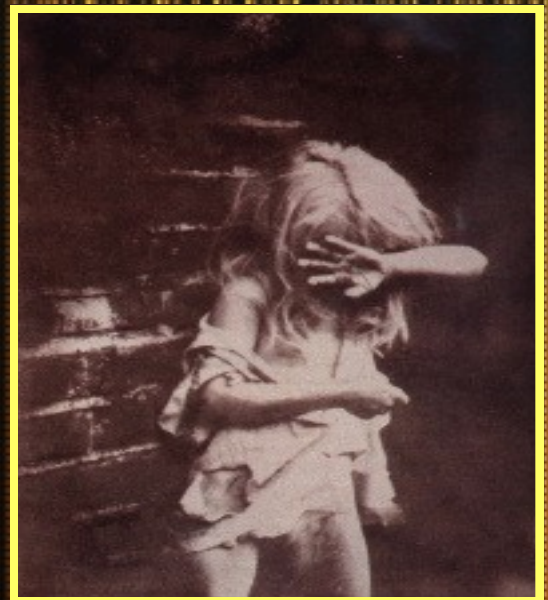
Victorian Waifs

The Victorian Waif photos are a series of photographs previously thought to have been taken by Francis Hetling. In 1978, four years after being put in an exhibit in London's National Portrait Gallery, they discovered that the actual photographs believed to have been taken in the 1840s were actually taken a few years prior to their placement in the exhibit. Howard Gray, the actual photographer of the pictures, went around London getting girls to pose for him. When taking the pictures, he did not think about a few qualities that would give him away, first of all, in the picture below, the girl would have had to stay in that pose for hours for the girl to actually appear in the photograph because the cameras at the time were not as sufficient as the cameras today. Secondly, in some of the pictures, the children were plump, and poor children at this time wouldn't have been as round as they were in the pictures.

Did You Know?

- A Victorian waif was a child who did not have a home or family. Victorian refers to the time period between 1837 and 1901, the time when England's Queen Was Queen Victoria.

A photo that was forged by Howard Gray. This photo, if taken in the Victorian era, would have taken hours to capture the image of the girl, so it is clearly a forgery because the girl's position suggests the camera captured the picture much quicker than cameras of the time could have done.



Rospigliosi Cup

Reinhold Vasters is believed to have forged the Rospigliosi Cup during the late 1800s. He was a German goldsmith who created this piece and attempted to pass it off as a work of Benvenuto Cellini's from the 1500s. The cup was so similar to Cellini's style that it was likely to never have been discovered as a fake. Fortunately, Vasters' original sketches of the cup were found and used to prove the sculpture was a fraud.



Did You Know?

- The Rospigliosi Cup is also known as the Cellini Cup, named for Benvenuto Cellini, who was an Italian goldsmith, painter, sculptor, soldier, and musician. He wrote a famous autobiography and was one of the most important Mannerism artists.

Etruscan Terracotta Warriors

The Etruscan terracotta warriors are art forgeries created to resemble art of the ancient Etruscans. Sold to the New York Metropolitan Museum of Art between 1915 and 1921, the statues were actually fabricated by two Italian brothers, Pio and Alfonso Riccardi, and three of their sons. The three designed were known as **Old Warrior**, Colossal Head, and Big Warrior, the last selling for \$40,000. Soon after their debut exhibition, various art historians suspected that the statues were fakes based solely on stylistic and artistic attributes. In 1960, it was found through chemical testing that the pieces had a glaze that contained manganese, an ingredient not used by the ancient Etruscans. Later, the forgers confessed to the crime, explaining that the pieces had been made separately because they lacked a large enough kiln to fire them in. As evidence the forgers produced the missing thumb of the Old Warrior which had been kept as a keepsake.



Big Warrior



Colossal Head

Flower Portrait

The Flower portrait is a painting of William Shakespeare, getting its name from its previous owners, the Flower family, who donated it to the Royal Shakespeare Company in 1892. The portrait was thought to be the work of which the Droeshout's engraving was modeled after. The painting has a signed date of 1609, however experts became suspicious of its true origins. In 1904, an art critic, Marion Spielmann, performed a detailed analysis on the portrait and determined that the painting was closer to the later edition of Droeshout's engraving rather than the original print. An x-ray of the painting in 1966 revealed that the Flower portrait had been painted over a 16th century painting that depicts a Madonna and child with John the Baptist. However, the Flower portrait still had several firm believers in its **authenticity**.



After an investigation performed by experts of the National Portrait Gallery of the UK in 2004, it was announced that the painting was not **contemporary** to Shakespeare. It was found that the pigment, chrome yellow, used to paint the golden braid of the doublet was not available before 1814. Because the particles of the chrome yellow were part of the normal layer of paint, the pigment was available at the time the portrait was created, proving that the painting is not from the 17th century.

Michelangelo's Cupid

The most famous Renaissance art fraud was the work of a youthful Michelangelo. In 1496, he sculpted a sleeping cupid. He then buried the sculpture in acidic soil so that it would appear to be a very old piece. The work's apparent age would increase its value and would sell at a higher price. Michelangelo sold the sculpture through a dealer to Cardinal Raffaele Riario of San Giorgio who eventually learned that the sculpture was artificially aged. Although he demanded his money back from the dealer, he allowed Michelangelo to keep his percentage of the sale because he was so impressed with his work. His youthful indiscretion was overlooked because of his obvious talent. Later, the sculpture was displayed adjacent to a genuine antique sleeping cupid; however by the 17th century Michelangelo's sculpture was lost.



Samson Ceramics

Edme Samson, born in Paris in 1810, was the founder of the ceramics firm Samson Ceramics and one of the most famous art copyists. His career began in the late 1830s, when he began making **replicas** of ceramic pieces of art. He intended these copies to be used in museums and private collections, but not to be passed off as originals.



In the late 19th century, fine china became very popular and Samson's company began to create these kinds of replicas. Although Samson intended his products to be sold as replicas and each piece was marked as such, many others tried to pass off the copies as original pieces of art. The marks that revealed Samson's pieces as fakes could be removed and replaced with other marks; however, Samson's products could never truly pass off as originals. His ceramics were produced from hard-paste porcelain, while the genuine pieces were created using soft-paste porcelain.

Getty Kouros

The Getty Kouros is a gigantic statue of a late archaic Greek kouros. It represents the idea of youthfulness. The marble sculpture was bought in 1985 by the J. Paul Getty Museum in Malibu, California for a price of \$7 million. Its **authenticity** has been questionable from its discovery, despite the initial scientific findings of genuine aging of the marble. Recent demonstrations of producing de-dolimitization artificially on the stone has caused many to believe that it is a fraud. However, this doubt of its genuineness does not diminish from the extraordinary technical sophistication and degree of artistic ability. The status of the sculpture remains undetermined and its description in the museum reads, "Greek, about 530 B.C., or modern forgery."



Copying Vs. Forging



Basic art classes involve then students engaging in making replicas of famous pieces of art. This is done to honor the artist to whom the original work can be credited. The imitation of artists' work also helps students improve their painting techniques. Art students do not try to pass off their work as the original masterpiece , therefore It is not forgery. If the pieces of art where to be replicated and claimed to be the original piece, then that is considered forgery of ant artist's work.

Pastiche

Pastiche is a multimedia genre based on mimicry and medley. While it is illegal to pass off an imitation as an original, it is perfectly legal, and often deemed a sign of respect, to create a piece in the style of another. Interestingly, this is not limited to the visual arts, but also expands into music and literature. These two forms of pastiche tend to incorporate a clear semblance of another artist, but do such respectfully and usually have little relation to the work being copied. For example, the musician Weird Al Yankovic often mimics the tunes to other songs, but rewrites all of the lyrics with a focus on an obscure topic. He took the tune of “I want it that way” by the Backstreet Boys and wrote a song about shopping on the web page e-Bay. The song “Bohemian Rhapsody” by Queen is also considered a pastiche as it mixes a variety of different styles into a cohesive work.

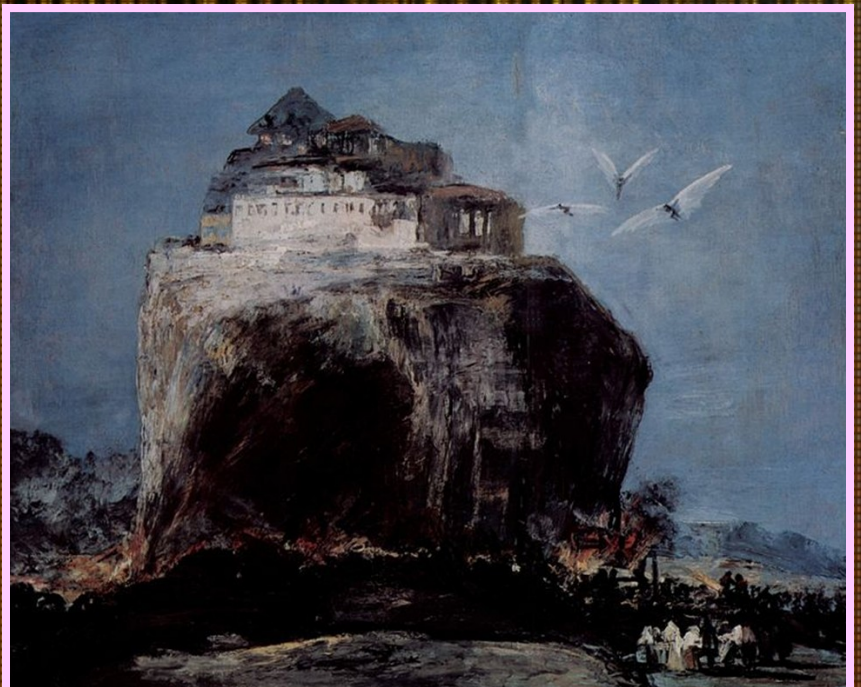


Maker of parodies and pastiches, Weird Al Yankovic mimics the styles and rhythms of others, but replaces the lyrics in a comedic, “alternative” genre of music.

Pastiche cont.

In the visual arts it is actually common for a rising artist to explore new styles by copying the works of masters. By making a pastiche the student is deeming the original artist as a skilled craftsman. While developing one's own skills the virtuoso's fame is spread further. The same also applies in cinematography with the imitation of the visual themes, angles, landscapes, and lighting conditions. Pastiche only becomes an issue when the piece is sold or distributed as the work of the artist being modeled. In one known case, a maker of pastiches was turned into a forger by an art dealer who claimed that he could sell the paintings as if they were the originals. The pair were eventually caught, arrested, and forced to reimburse everyone that had purchased the forgeries.

A City on a Rock is a pastiche celebrating the work of Francisco Goya. The setting bears a resemblance to his work, *May Tree*, but gives a different angle on the events taking place. For a few years, the painting was actually thought to be one of Goya's original works.



Organizations-Intro

While forgery is labeled as an illegal act and can be terminated by the police, it is often times the work of organizations that take down art criminals. Groups are formed to abolish art crime and spread the word of its destruction. While some of these organizations are already government run, others are pushing for further political involvement in ending the issues of forgery. Illegal art distribution and theft constitute an \$8 billion market that funds drug dealing, weapons trade, and terrorism. Single cases of theft can reap hundreds of millions of dollars at a time and forgery rings often go unnoticed. Despite this, most countries do not have any art police or agencies of art regulation. Organizations bring these facts to light and act upon them to preserve history, culture, and imagination. Working alongside the law, many organizations use old acts and inspire about new regulations so as to improve the judicial treatment of art crime. Some corporations act as bridges to allow countries to reclaim stolen, exported art work and ensure that criminals face justice.

Organizations-Associations for Research into Crimes Against Art

Unlike most other conglomerates, the Association for Research into Crimes against Art, or ARCA, is a non-profit, non-governmental organization and seeks to improve the quality of investigation into art. Composed of several prominent figures of world of art and investigation, ARCA promotes the study of art crime and research on methods of verification. Being a non-profit corporation, funding comes from the donations of its members and supporters. ARCA offers assistance in international art crime, and aids police with investigations. The group also funds and produces a number of essays, journals, and books addressing art forgery and theft so as to educate the public on this grave issue. The organization has even developed a television series on the matter. The conglomerate is also working towards a Masters program in the study of art crime and a number of awards for the study and termination of art crime. ARCA also hosts conferences for police, guards, curators, and professors on criminal activities in the art world.



Documents Used Against Art Forgery

There are several acts that are commonly utilized in order to charge art criminals, one of which is the Racketeer Influenced and Corrupt Organizations Act, also known as RICO. This act targets entire organizations at a time, so that the criminals' officers are also charged. With this act one who has another create a forgery is also deemed guilty of fraud. Although originally used to take down Mafia members, RICO is also used by many art organizations to halt crime. Another commonly referred to document is the FTC act, which is still updated today. This act primarily focuses on preventing unfair means of competition, but also addresses issues of fraud from false advertisement to outright forgery. Strengthening the ability of the FTC to issue cease-and-desist orders, this act has been used to tackle forgery operations such as that of Magui publishers. This document is more often utilized by government based organizations and has also been employed by the United States Congress.



Federal Trade

Although it was not formed to halt art forgery, the Federal Trade Commission often investigates and terminates criminal action in the art market. Seeking efficient law enforcement, the organization defends the economic rights of consumers and businesses. The original purpose of the commission was to tackle competition; however, this was redefined and expanded on with the additions of new laws. The act prohibiting “unfair or deceptive acts or practices in or affecting commerce” that was passed by Congress in 1938, allows the FTC to halt forgers and distributors of false works.

In a case from 1993, the FTC took down an organization, Magui Publishers, based primarily on the forgery of prints and etchings attributed to by Salvador Dali. The art printing company distributed prints of Dali’s work with false signatures and no consent from the artist. With the forged artwork came falsified documents claiming authenticity. Magui Publishers continually claimed err in the FTC’s investigations, but upon scrutiny no erroneous information was found. The company was charged with the repayment of \$1.96 million and was forced to cease and desist. Employees of the company and the forgers involved were all charged for their crimes.

Archeological Forgeries



Archeological relics are forged so they can be sold to museums for large sums of money.

Among the years, many archeologists have set up excavations to unearth artifacts that would tell us more about pre-historic life and civilizations. When these relics are found, they are normally sold to museums where they can be studied further. Forgers replicate these antiquities to make money, and for a while they have succeeded, numerous works of art and photographs such as Francias Hetling's Victorian Waifs have been in museums for years before they have been reviled to be fakes. In order to detect whether an ancient artifact is authentic or not, scientists mostly perform neutron activation tests, as well as carbon dating tests.

Archaeoraptor

Archaeoraptor was announced the missing link between birds and non-avian dinosaurs. Found in China, scientists wanted to test it to check if it was authentic because prior to its excavation, Johann Beringer had forged several fossils. Also, some evidence was found suggesting it was fake. A method of detection, high-resolution X-ray computed tomography, was used to analyze the fossil. Fracture patterns and distributions of materials throughout the volume of the dinosaur were analyzed, and by carefully reviewing the high resolution images of its skeletal tissues, scientists were able to declare the fossil a fake.

The fossil of the forges Archaeoraptor, later discovered to be a fake.



Neutron Activation



Neutron Activation analysis sample loading station.

Basic art classes involve then students engaging in making replicas of famous pieces of art. This is done to honor the artist to whom the original work can be credited. The imitation of artists' work also helps students improve their painting techniques. Art students do not try to pass off their work as the original masterpiece , therefore It is not forgery. If the pieces of art where to be replicated and claimed to be the original piece, then that is considered forgery of ant artist's work.

About Us



Megan McHugh, a sixteen-year old student from Worcester, Massachusetts, is a published author of “Recycling and Waste Management”, a chapter in a book about sustainable energy. In her spare time, Megan enjoys hanging out with her friends, reading books, and playing videogames.

Grace DiFrancesco is a junior attending the Massachusetts Academy of Math and Science. She participates in sports such as field hockey, indoor track, and tennis. Her future plans include further education in engineering science and a career in the engineering field.



About Us



Cai Debenham was born in San Francisco on March 10, 1994. He lives in Weston and attends the Massachusetts Academy of Math and Science as a Junior. Cai is a member of FIRST robotics team 190 and is prepared for a future focus of study in engineering.

Joseph Gencarelli is a student at Massachusetts academy of Math and Science. He enjoys spending time with his family and friends, listening to music, and in the summer he particularly likes to swim and go to the beach. Future plans for this inquisitive student includes traveling and studying.



Glossary

Authenticity: the quality of being authentic; genuineness.

Craquelure: Unique crack formations developed with time

Idiosyncrasy: A stylistic habit of an individual

Isotopes: Atoms with slight variations in the number of neutrons in the nucleus.

Neutron: a particle located in the center of an atom; it has no charge unlike protons and electrons do.

Nuclei: singular nucleus, the center portion of the atom, comprising Protons, positively charged particles, and neutrons, neutral charged particles.

Oxidized: to have chemically combined with oxygen.

Parody: A comedic mimicry of a work or event

Pastiche: A hodge-podge or mimicry of a work or works

Provenance: The documented history of a work that marks its authenticity

Racketeer: One participating in illegal actions for profit
a copy or reproduction of a work of art produced by the maker of the original or under his or her supervision

Image Credits

Page 3: <http://www.artfakes.dk/meegeren.htm>

Page 4: <http://www.skyarts.co.uk/art-design/print/mastering-the-art/mastering-the-art/>

http://philbrookmuseum.blogspot.com/2010_05_01_archive.html

Page 5: http://www.sciencephoto.com/images/download_lo_res.html?id=721600095

Page 6: http://www.freemanart.ca/forensic_examination_art.htm

Page 7: <http://www.tnunn.ndo.co.uk/emmaus.htm>

Page 9: <http://dailyartmuse.com/2010/12/01/pascal-oudet/>

Page 11: <http://www.trocadero.com/solo36/items/269239/item269239store.html>

Page 12: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1027828>

Page 14: <http://www.beazley.ox.ac.uk/pottery/collection/classical4.htm>

Page 17: <http://brain.cc.kogakuin.ac.jp/~kanamaru/WaveletJava/JavaWaveletImage-e.html>

Page 18: <http://www.cs.dartmouth.edu/farid/research/tampering.html>

Page 19: http://www.museumofhoaxes.com/hoax/photo_database/image/francis_hetlings_victorian_waifs/

Page 21: <http://ancientstandard.com/2007/11/06/sometimes-you-find-artifacts-sometimes-you-make-your-own-%E2%80%93-the-story-of-the-etruscan-terracotta-warriors-ca-8th-c-bc%E2%80%A6-but-actually1915-ad/>

Page 22: <http://www.shakespearesengland.com/2010/04/faces-of-shakespeare.html>

Page 23: <http://www.art-prints-on-demand.com/a/michelangelo-caravaggio/sleeping-cupid.html>

Page 26: <http://www.squidoo.com/musee-orsay>

Page 27: http://en.wikipedia.org/wiki/File:Francisco_de_Goya_y_Lucientes_001.jpg

Page 29: <http://www.artcrime.info/>

Page 30: http://en.wikipedia.org/wiki/File:Scale_of_justice_2.svg

Page 31: <https://wikispaces.psu.edu/display/IST432SP11Team6/FTC+vs.+Zachary+Keith+Hill>

Page 32: <http://www.bib-arch.org/scholars-study/antiquities-trial-00.asp>

Page 33: <http://www.ctlab.geo.utexas.edu/pubs/nature2000/>

Page 34: http://www.ansto.gov.au/business_services/doing_business_with_ansto/neutron_analysis