Various Approaches to the Preservation and Conservation of Cultural Textiles

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Abstract
The field of textile conservation encompasses a range of methods and materials designed to safeguard, restore, and uphold textiles that hold historical, artistic, or cultural importance. As this discipline has progressed, conservators have devised an array of treatment strategies that blend both time-honored and modern techniques, with selections made according to the specific condition and significance of each textile. This article provides a comprehensive overview of the fundamental materials and methodologies employed in textile conservation, with particular emphasis on the processes of cleaning, repairing, stabilizing, and storing textiles. In addition, the discussion includes the ethical dilemmas and challenges that conservators encounter in their quest to choose suitable materials for intervention.
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Introduction

Textiles represent delicate cultural treasures that are particularly susceptible to a variety of environmental influences, including light exposure, humidity, fluctuations in temperature, and physical interaction. These factors can lead to the degradation of fibers, the fading of colors, and the gradual disintegration of the textile's overall structure. The discipline of textile conservation is dedicated to the safeguarding of these materials, employing both preventive strategies and active restoration techniques. Effective conservation efforts must carefully navigate the dual objectives of maintaining the integrity of the original textile while simultaneously preventing further deterioration. This necessitates a judicious choice of materials that are stable, reversible, and harmonious with the textile's intrinsic properties. The methodologies employed in conservation range from traditional sewing practices to innovative techniques such as laser cleaning and the use of synthetic adhesives. Given the diversity in age, purpose, and composition of textiles, conservation strategies must be flexible and adhere to ethical standards. This paper provides an overview of the principal materials and methods utilized in the field of textile conservation, examining their efficacy, constraints, and the ethical dilemmas associated with the preservation of these invaluable artifacts.

Materials Employed in Textile Conservation:

In the realm of textile conservation, the selection of materials hinges on their capacity to uphold the integrity of the textile while ensuring reversibility and non-detrimental effects. The subsequent sections delineate the array of materials typically utilized in conservation efforts.

Fibres and Fabrics:

Conservation treatments predominantly involve the use of primary fibres and fabrics, including cotton, linen, silk, wool, and synthetic options. Cotton and linen are frequently favored for mending or as linings due to their neutral characteristics and practicality[1]. In contrast, silk and wool are often employed for valuable historical textiles, attributed to their exquisite texture and compatibility with numerous historic materials. Synthetic fibres, such as polyester and nylon, may be utilized when the original fabric exhibits excessive fragility, as they provide stability and resilience; however, careful selection is imperative to prevent any incompatibility with the original textile. For stabilization purposes, thin, transparent support materials like silk crepeline or polyester net are preferred, as they minimize visual disruption and facilitate analysis of the fabric from both sides.[2]

Adhesives and Bonding Materials:

Play a vital role in conservation, functioning as either temporary aids or permanent solutions. The careful choice of these materials is fundamental to preserving the reversibility of the conservation methods employed. Starch paste, derived from natural sources such as wheat or rice, has been utilized in textile conservation for centuries. This particular adhesive is particularly suitable for lightweight fabrics, offering the advantage of easy removal or modification without inflicting damage on the textile.[3]

In contemporary practices, synthetic adhesives like Paraloid B72, an acrylic resin, have gained prominence due to their robust bonding capabilities and the convenience of reversal with organic solvents. Additionally, cellulose-based adhesives, such as methylcellulose, polyvinyl alcohol (PVOH), and hydroxypropyl cellulose, are frequently adopted for their neutral properties and long-term stability in conservation efforts.[4]

Dyes and Inks:

are also integral to textile conservation, often employed for retouching or achieving color matching during repairs. Natural dyes, historically utilized in textile production, are favored for their authenticity and their capacity to blend harmoniously with the original fabric[5]. Nonetheless, synthetic dyes may be indispensable for certain repairs, given their superior availability and color consistency. It is crucial to select dyes with care, ensuring they possess lightfastness and stability, thereby minimizing the risk of fading or adverse reactions with the original fibers.[6]

2- Procedures for Conservation of Textile

This article of textile conservation is limited to the natural fibers of animal and plant origin: wool, hair, silk, cotton, flax, jute, hemp, nettle, grass, etc. The animal fibers are primarily made of protein and are more resistant to decay than the vegetable fibers which are composed primarily of cellulose. For instance flax and cotton are very susceptible to attack by bacteria under humid conditions and seldom survive in archaeological environments. All textiles are deteriorated by light, insects, microorganisms and air pollution which singularly or together cause considerable loss of tensile strength and pliability. The oxygen in the atmosphere affects all organic substances to varying degrees. Textiles

are very prone to aging and deterioration from exposure to the atmosphere. Prolonged exposure to normal atmospheric conditions will cause textiles to weaken and disintegrate. The speed of

the deterioration varies according to the nature of the fibers and existing local conditions. The main factors that promote the decay of textiles can be categorized into three groups:[7]

1. Organic - Because textiles are organic, they are subject to attack by molds and bacteria. Decomposition is greatest in situations that favor the growth of these organisms such as damp heat, stagnant air and the contact of the material with vegetable matter. Attack by destructive insects may also be encountered.
2. Physical - Excessive heat causes desiccation and embrittlement, whereas exposure to ultra-violet light causes a type of deterioration known as tendering and photochemical degradation of susceptible dyes.
3. Chemical - Exposure to noxious gases also cause tendering. In some cases these gases are converted to acids which are the main cause for the deterioration of some textiles.

The proper treatment of textiles usually requires the use of flat, shallow pans, hot plates, and racks or other devices to support fragile textiles during rinsing, treatment, and drying. Treatment involves: [8]

2-1 Preliminary Cleaning

The process of cleaning constitutes an essential phase in the conservation of textiles, focusing on the elimination of dirt, oils, and various contaminants while safeguarding the integrity of the fabric. For delicate textiles, mechanical cleaning techniques, including vacuuming and air brushing, are frequently employed due to their efficacy in extracting surface dust without inflicting abrasion. Conversely, wet cleaning, which utilizes gentle detergents and cold water, is applied to textiles that can withstand moisture exposure. For sturdier materials, solvent cleaning involving alcohols or acetone is deemed appropriate.[9]

Cleaning may be done using soft brush or vacuum cleaner. This is done to remove dust and dirt on the objects.

The other way of cleaning is by washing. This sounds simple but when speaking of textile conservation this must be done after all the test are made because this is an irreversible process. Once the color fades or bleed no more repair can be done. Washing textile must be done carefully.[10]

2-2 Laser Cleaning:

Laser cleaning has surfaced as an innovative non-destructive technique for eliminating surface impurities, including corrosion, dust, and biological matter. The application of a Nd:YAG laser, operating at wavelengths of 532 nm or 1064 nm, facilitates meticulous cleaning while avoiding mechanical strain on the surfaces. Noteworthy implementations of this technology encompass the restoration of silver and copper threads found in historical textiles, as well as the preservation of Egyptian archaeological artifacts. This method demonstrates particular efficacy for composite textiles featuring metallic threads, where conventional solvents could potentially inflict harm[11]. Recent advancements in the use of ultrashort laser pulses have shown exceptional promise in eradicating pollutant layers measuring several tens of nanometers in thickness, achieving high power output while effectively mitigating adverse effects[12].

2-3 Stabilization and Consolidation:

In instances where textiles exhibit brittleness or a reduction in structural integrity, the implementation of stabilization techniques becomes essential to avert additional deterioration. A fundamental aspect of textile preservation is the consolidation of fibers, which entails the introduction of protective substances aimed at reinforcing delicate fibers. Acrylic resins,

notably Paraloid B72, are commonly employed for this purpose, given their capacity to adhere effectively while maintaining the original aesthetic of the textile. Likewise, consolidating gels or sprays are utilized on textiles that possess a level of fragility rendering them unmanageable without appropriate support.[13]

Reinforcing delicate textiles frequently necessitates the attachment of these materials to a synthetic mesh composed of terylene, lightweight cotton, fiberglass, or similar substances. In instances where alternative treatment methods are inadequate, it is not uncommon to mount fragile textiles between sheets of plastic or glass. Typically, a heat sealable adhesive such as polyvinyl alcohol (PVA), polyvinyl acetate (PVAl), Acryloid B-72, or their emulsions is utilized to coat the backing material, which is subsequently ironed onto the textile to achieve a secure bond. In various cases, synthetic resins are employed to enhance the strength and durability of fragile fabrics. The most frequently recommended options include:

Polyvinyl alcohol, which is water-soluble, dries transparently, and exhibits minimal shrinkage.

Polyvinyl acetate (V7), though it may cause distortion of fibers due to shrinkage.

Ethulose (ethyl-hydroethyl cellulose), known for its water solubility and exceptional pliability.

Polymethacrylate.

Acryloid B-715% dissolved in toluene.

Given that water can soften and make textile fibers more manageable, emulsions and water-soluble resins are often favored for various conservation tasks. Moreover, water-based adhesives afford conservators extended working time. A formulation consisting of 0.15% ethyl-hydroethyl cellulose, 0.6% polyethylene glycol (PEG) 400, and 0.2% fungicide has proven effective in consolidating fragile fabrics while simultaneously reintroducing moisture to dry, brittle fibers. Throughout the conservation procedure, any ruptures in the threads, whether in the warp or weft, should be secured with small drops of adhesive to prevent further unraveling.[14]

2-4 Sterilization

The conservation process may have successfully resulted in sterilization. To effectively address issues related to mold and insect infestations, it is recommended to enclose the affected items within a sealed container containing thymol crystals. The vaporization of these crystals can be facilitated by positioning the container above a light bulb. Following the application of thymol, it is advisable to mist the items with a Lysol solution at a concentration of 0.5-1%. This approach typically resolves the majority of concerns. Should further intervention be required, it is essential to evaluate the conditions under which the items are stored. Additionally, carbon disulfide can serve as an alternative fumigant.[15]

2-5 conservation of textile

In addition to the usual preventive conservation recommendations, here is a list of the most recommended and commonly used materials for textiles:

• Tissue paper: acid-free and without alkaline reserves (protein fibers and some dyes are sensitive to alkalis).

• Neutral cardboard without alkaline reserves.

• De-stained cotton canvas, cotton that has been stripped of its finishes (organic; linen and hemp are sustainable and locally sourced alternatives to consider).

• Cotton jersey (organic; linen and hemp are sustainable and locally sourced alternatives to consider).

• Medical jersey, for example, as a stockinette to hold padding on a hanger.
• Synthetic fabrics: polyester and polyamide; silk (do not use wool, which contains sulfide bonds).
• Synthetic non-woven fabrics
• Thermally bonded polyester wadding for quilting and padding.
• Cotton fleece.
• Expanded polyethylene foam.
• Polyester films.
• Polyethylene covers.
• High- and low-density polyethylene foam (for supports requiring a firm core, such as headpieces).
• Polyethylene hangers (wood presents a risk of infestation and additional cost, while metal poses a risk of rust and condensation).[16]

After a series of tests by the Conservation Division of the Western Australia Museum on canvas and rope recovered from a ship sunk in 1803, the following sequence of treatment is proposed for the conservation of canvas (and other similar fabrics) and rope. Steps not applicable are skipped.

1. Immerse in 10% hydrochloric acid to remove adhering encrustation and some iron corrosion and stains.
2. Rinse in running water. Watch for any dyes that may be adversely affected.
3. Soak in acetone to remove any tar, pitch, tallow or other acetone soluble substances. Watch for any dyes that may be removed.
4. Soak in 5% oxalic acid to remove the bulk, if not all of the iron stains. Time will vary from a couple of hours to a couple of days.
5. Immerse in 5% EDTA disodium to remove any remaining iron stains. Soaking time will vary from a couple of hours to up to 3 days. Both steps 4 & 5 may be required for particularly stubborn iron stains. At other times either 4 &/or 5 may be used.[17]

A hydrogen peroxide solution can be employed for the treatment of particularly obstinate stains. For such cases, a more concentrated H2O2 solution, ranging from 10% to 20%, may be applied for brief intervals. This method is restricted to white fabrics, canvas, and textiles. It is generally unnecessary for rope materials. It is imperative to note that hydrogen peroxide should never be utilized on hair.

It is crucial to conduct a thorough rinse using deionized or distilled water, particularly when dealing with delicate fabrics.

Following this, the items should be dehydrated using acetone and allowed to air dry completely. If required, the fabric may need to be reinforced with an appropriate synthetic resin. In certain cases, it may be necessary to apply a heat sealable resin and to either dry mount or heat seal the fabric onto a backing material, such as lightweight cotton or synthetic mesh[18].

Conclusion

In conclusion, the realm of textile conservation embodies a complex interplay of various factors necessitating the judicious choice of both materials and techniques to safeguard invaluable artifacts. As this discipline progresses, the integration of innovative technologies and materials

enhances the efficacy and efficiency of conservation practices. Nonetheless, significant challenges persist, particularly in reconciling the need for intervention with the preservation of authenticity, as well as in ensuring the sustainability of the materials employed. It is anticipated that forthcoming developments in textile conservation will prioritize the creation of novel sustainable approaches while upholding rigorous preservation standards.

To ensure the longevity of textiles, it is essential to maintain specific storage conditions, with the foremost considerations being the avoidance of atmospheric pollutants and the limitation of exposure to ultraviolet light. Relative humidity should not exceed 68%, as levels above 70% create a conducive environment for mold proliferation. Ideally, textiles should be kept in a dark environment where the temperature remains at a low 10°C (50°F) and the relative humidity is at or below 50%. Such conditions are crucial in preventing the bio-deterioration of cellulose found in plant fibers due to microbial activity. Furthermore, to discourage moth infestations and other insect threats, the inclusion of mothballs containing paradichlorobenzene in the storage area is advisable, particularly for woolen items. This compound acts as a volatile insecticide, providing robust protection against insect damage. In instances where mold is discovered, it is recommended to treat the affected fabric with Dowicide 1 while simultaneously rectifying the environmental conditions in storage. Although commercial options like Lysol Disinfectant Spray are effective, should there be any uncertainties regarding the chemical composition of Lysol, an alternative can be crafted by following the previously mentioned formula for a homemade disinfectant spray.

References

[1] - Charlotte(P), Aide a la Décision en Conservation Préventive Des Textiles, Association General Des Conservateurs Des Colection Publiques de France, France, 2020, pp 48-49.

[2] - SAROJ (Y), NEELAM (M), Preserving Fabric Legacies: Techniques for the Conservation of Cultural Textiles, International Journal of Applied Home Science, V12, 2025, p.268.

[3] -Istvan(E), Conserving textiles, ICCROM , Hangarian,2004, p.147-150.

[4] - SAROJ (Y),Op.Cit, p.269.

[5] - Cris(C), Dyes, Paints, and Inks: An Overview of Visual Compensation Techniques in Textile Conservation, Editorial Universitat Politècnica, Valencia,2021, pp.212-213.

[6] - SAROJ (Y),Op.Cit, p.269.

[7] - Donny L. Hamilton, Basic Methods of Conserving Underwater Archaeological Material Culture, Nautical Archaeology Program, Department of Anthropology, Texas A&M University, USA, 1997, p.49.

[8] - Ibrahim (M), Scientific principles for the restoration and conservation of Archaeological Material Culture, Egypte, 2014, p.259.

[9] - SAROJ (Y),Op.Cit, p.269.

[10] - Erine(S.M), Conservation Of Textile, Chemistry and Conservation Laboratory, National Museum Manila, philippines, p.2022.

[11] - SAROJ (Y),Op.Cit, p.269.

[12] - Escudero and Others, Study of Lazer Cleaning of Ancient Fabric With Femtosecond Pilses, LACONA Proceeding, of the International Conference, Spain, 2007, pp, 17-21.

[13] - Kousoulou, (T), Research and documentation at the service of historic textile conservation, in the Directorate of Conservation, Hellenic Ministry of Culture. In International Symposium 'Work of Art and Conservation Science Today,2010,pp. 26-28.

[14] - Donny L. Hamilton, Op.Cit, p.52.

[15] - Ibrahim (M), Op.Cit, pp.61-62.

[16] - Charlotte(P), Op. Cit, p.48.

[17] - Donny L. Hamilton, Op.Cit, p.52.

[18] - Ibrahim (M), Op.Cit, p.63.