

CONSERVATION PROCEDURES

7.5 Conservation Treatment for Works of Art and Unbound Artifacts on Paper

This leaflet describes some of the principal operations carried out by paper conservators for the treatment of select artifacts and collections materials after extensive communication between the conservator and the client or collection's custodian. There are many variations and different levels of treatment, and the conservator may offer alternative preservation options after a thorough examination of the objects in question. The treatment procedures that are ultimately chosen will depend on several considerations including the condition of the artifact, its future use, its aesthetic significance, what the media will allow, and, inevitably, the client's financial resources.

The following conservation procedures are described for information purposes only and should not be performed without the consent and direct supervision of a professional conservator specializing in the treatment of paper-based historic materials or works of art.

EXAMINATION AND INITIAL REPORT

Treatment is always preceded by a careful examination of each object. Before beginning work, the conservator will provide a written report outlining the object's condition, the proposed treatment plan, and the estimated cost to perform the treatment. A variety of examination tools are available to the conservator to glean information that will allow the conservator to formulate the

appropriate treatment plan. During the examination period, object testing will be carried out to determine the fragility of the media, sensitivity or solubility of all media to a variety of solvents including water, and the structural integrity of the paper support. A well-developed treatment plan is designed to address the aesthetic and structural deficiencies of an object to ensure its safety and long-term preservation.

DOCUMENTATION

During the course of treatment, the conservator will maintain written notes on all procedures, carefully noting any chemicals that are used and all treatment materials that are applied to an object, such as mending papers and adhesives. Photographs are taken of each object before and after treatment, and occasionally during treatment, as a visual record for reference. In the case of a large collection of documents, photographs of selected individual items that represent the condition of a large group of similar objects may be sufficient when photographing every single object would be impractical. Upon completion of treatment, a final written report is provided to the client with copies of the photographic record.

SURFACE CLEANING

Superficial grime, dirt, and soot may be reduced with a soft dry brush, nonchemical vulcanized rubber sponges, latex-free cosmetic sponges, or nonabrasive

erasing materials such as vinyl erasers, both in blocks and grated granules. Cotton swabs dampened with organic solvents are also sometimes used to locally reduce oily grime such as fingerprints. Care must be taken when surface cleaning not to affect friable media such as pencil and pastels nor to create solvent tidelines when solvents are applied. Some soft papers, such as Japanese prints, may be abraded using sponges or eraser granules, so care should be taken to first test the object's ability to withstand erasure.

REMOVAL OF MOLD, INSECT RESIDUES, AND OTHER ACCRETIONS

Accretions on the surface of the paper, such as fly or other insect specks and other residues, are normally removed by applying a variety of specialized tools including scalpels, aspirators, or specialized HEPA vacuum cleaning equipment. Surface mold is best removed by using a small vacuum aspirator or a HEPA vacuum cleaner designed for decontamination purposes and a small soft brush (not your standard commercially available vacuum cleaners that can actually disperse mold contaminants into the air). It is usually not possible to eliminate all traces of mold, since the mycelia may be deeply rooted in the paper. Ingrained black mold cannot be reduced while non-black mold staining might be reduced by controlled chemical bleaching. Fumigation, once a standard treatment for mold and insects, is now seldom done because chemical fumigants can have adverse effects both on artifacts and on personnel. (Some formerly-used fumigants having now been classified as potentially carcinogenic.) Deep freezing may be appropriate to kill insects and to temporarily keep mold from spreading. Deep freezing for insect extermination is most effective at temperatures between -30°C and -40°C (-22°F and -40°F) for a minimum of one week, and the objects will require specialized freezer packaging.

CONSOLIDATION AND FIXING

When absolutely necessary, flaking or friable media may be consolidated or fixed with an appropriate natural or synthetic material to stop or at least inhibit ongoing loss. Consolidation is temporary in that the applied material may be removed, while fixing is considered a more permanent option since its removal may result in superficial damage to the media. When it is desirable to wash a paper artifact, small areas of water-soluble color can sometimes be consolidated or fixed with brush applications of a dilute synthetic resin. This treatment can make it possible to safely wash without any loss of color, but it is practical only for isolated areas of soluble media. Occasionally, photograph-based portraits known as "crayon enlargements" that are enhanced with charcoal, chalk, or pastels can be fixed using spray applications of a very dilute synthetic resin without altering their appearance. Fixatives and consolidants should be stable, non-yellowing, and reasonably reversible.

REMOVAL OF BACKINGS

If an object has been backed with a support that is not part of its original structure and the backing is destructive or inadequate, it should be removed if possible without putting the object at risk. Sometimes backing removal can be done in a water bath if a water based mounting adhesive was employed. If the object is very fragile or cannot be put in water, dry removal by mechanical means is necessary. Steam or local application of moisture can assist with mechanical backing removal to remove the final mounting layer of a backing immediately behind an object. Removing fragile paper from a solid backing is time-consuming and therefore costly. It is often difficult for a conservator to know in advance how long a backing removal will take or how much it will cost.

REMOVAL OF REPAIRS OR TAPES

Old or nonarchival repairs were often made using materials harmful to paper, such as pressure-sensitive (self-adhering) tapes and adhesives that stain (e.g. rubber cement). Even so-called “archival” tapes that have synthetic adhesives may migrate into the paper and be difficult to remove over time. Repairs made with water-based adhesives such as animal glue or starch often can be removed in a water bath, by local application of moisture, or with poultices or steam. Synthetic adhesives and pressure-sensitive tapes usually require heat and/or organic solvents for removal. Heat is sometimes helpful to remove these repairs but never in conjunction with flammable organic solvents.

WASHING

Water washing is often beneficial to paper. It not only lessens dirt and aids in stain reduction, but it can also wash out acidic compounds and other degradation products that have built up in the paper causing embrittlement and overall discoloration. Washing can also relax brittle or distorted paper and aid in flattening. For these reasons artifacts that are not visibly discolored or dirty might still benefit from washing. All media must be carefully tested beforehand for water sensitivity. When materials permit, objects are immersed in filtered water. On occasion, a carefully controlled amount of an alkaline chemical compound is added to the water to raise the pH to a slightly alkaline level. This can assist in the cleaning process and in the neutralization and removal of acidic compounds in the paper. Artifacts with soluble media may be blotter washed, float washed, or washed on a suction table.

ALKALIZATION (DEACIDIFICATION)

Although simple water washing reduces acidity, the addition of an alkaline buffer to paper is sometimes recommended. This is appropriate for papers that

will be subject to acid hydrolysis even after washing, acidic papers that cannot be washed, and acidic papers that will be encapsulated. Sometimes alkalization is achieved by immersion in an aqueous solution of an alkaline substance such as magnesium bicarbonate or calcium hydroxide. If water-soluble media are present, the artifact may be treated non-aqueously with an alkaline salt dissolved or suspended in a non-reactive solvent based carrier. Nonaqueous solutions are usually applied by spraying. While the addition of an alkaline buffer is often beneficial, such chemicals may cause alteration or even damage to specific pH-sensitive materials. Poor quality ground wood pulp papers may turn pinkish if alkalized. Some colors in a work of art may change with increases in pH, and these changes may be immediate or may occur over time. For this reason, alkalization is not recommended for blueprints, diazo prints, and photographic materials. Simply mounting, encapsulating, or housing papers using archival materials is a less invasive means of providing buffering. MicroChamber interleaving papers and matboards containing zeolites are especially protective due in their ability to absorb acids and pollutants. Like all conservation procedures, the decision to alkalize must be made on a case-by-case basis and should be left to a qualified conservator.

MENDING

Tears are carefully aligned and then repaired, usually on the reverse with narrow strips of Japanese tissue. Japanese *kozo* papers are long fibered and can span tears and breaks to sufficiently secure the fractures much better than short fibered cotton or linen rag papers. The width and thickness of the strips of tissue vary depending on the object being mended. Heavier papers require more substantial mends. The strips are adhered with a reversible, non-staining adhesive such as wheat starch paste or methyl cellulose. Sometimes synthetic adhesives are used when an

artifact cannot tolerate moisture. If there is writing on the reverse of the object, then fine, lightweight tissue is used to avoid obscuring the writing

FILLING AREAS OF PAPER LOSS

Holes or paper losses may be filled individually with Japanese paper, with paper pulp, or with a paper carefully chosen to match the original in weight, texture, and color. The latter is the most time-consuming (and consequently the most expensive) option, usually reserved for works of art. If the object can be immersed in water and if the conservator has the necessary equipment, multiple pulp fills on a single sheet can be achieved in a single operation by leaf-casting the sheet on a specialized machine. For archival objects of less aesthetic importance, conservators may simply back them (see below) and allow the backing sheet to fill the areas of loss. Backing sheets can be toned to make the discrepancy in appearance of the areas of loss less jarring.

BACKING (LINING)

Especially weak or brittle papers or sheets with numerous tears and losses may be reinforced by backing them with another sheet of paper. As a rule, the backing should be somewhat lighter in weight than the original. Japanese paper, either handmade or machine-made of high-quality cellulose fibers such as *kozo*, is the usual lining material, although Western papers are occasionally used, especially for photographs. The backing is usually adhered with a dilute starch-based paste, methyl cellulose, or a mixture of the two. Sometimes a synthetic acrylic adhesive may be necessary depending on the treatment circumstances.

Historically, oversized objects that required extra support such as maps and posters on thin paper were backed with woven fabrics like linen or muslin. During conservation treatment, such objects are first lined with Japanese paper before relining with fabric.

Historic wallpaper is likewise usually first lined with paper and then cloth so that it can be removed from the wall in the future. In such cases the object is lined first with paper, which isolates the object from the fabric, and then with high-quality washed linen or cotton.

INPAINTING (RETOUCHING)

Inpainting is done by judicious application of watercolor, acrylic, gouache, pencil, or pastel to filled areas of loss or to minor surface losses such as scratches, abrasions, and media losses along tears. The goal is to make these damages less distracting. Care should be taken to confine the retouching to the areas of loss; normally, areas of design are not replaced unless an exact copy of the object can be used as a reference. Simple design areas such as borders may be completed without referring to another copy if the design element is comprehensive and repeated elsewhere. Conservators attempt to integrate their retouching as much as visually possible, otherwise they are obliged to make it possible to distinguish their work from the original when a researcher or other viewer examines the work closely. Retouching, enhancing, or “strengthening” of faded writing is inappropriate conduct by a professional conservator.

BLEACHING

Stain reduction is time-consuming and complicated. It is warranted only when staining or discoloration compromises the aesthetic value of a work of art or exhibition material. Conservators often prefer bleaching with light because it is gentle and less harmful to cellulose than chemical bleaches. Some stains (e.g. mold stains), however, require the use of chemical bleaching agents. Sometimes a combination of bleaching methods is needed to achieve a desired result. Bleaching does not enhance the preservation of a work of art, only its appearance. It is important

to understand that the bleaching of paper results in some level of deterioration of the cellulose, so the risk versus visual benefit must be weighed very carefully.

Chemical bleaching of paper must be done under carefully controlled conditions with a bleach that is known to be reasonably safe for both the paper and the media. Chemical bleaching is always followed by a thorough water rinsing of the treated area. The bleach must be removed from the paper after treatment otherwise reversion of the discoloration may occur. Whenever possible, the chemical is confined to the area of stain, but sheets with extensive staining or discoloration are occasionally bleached overall. Such objects might be immersed in a bath, but more often the solution may be brushed or sprayed on. Only a handful of chemical agents are considered sufficiently benign to be incorporated into conservation treatments. Some chemicals commonly used in the past and still occasionally used today have proven to be harmful in the long run and have even caused the return of staining more severe than before. It is possible for staining to return, to a lesser extent, even after employing the safest and most up-to-date methods. Some stains, such as the brown spot staining referred to as “foxing,” seem more liable to reappear if they are exposed to excessive relative humidity after treatment.

FLATTENING

Flattening is always necessary following aqueous treatment. It is usually done between blotters or felts under moderate pressure after the object has been delicately humidified and relaxed. Objects that have been lined are sometimes dried and flattened by stretching on a specialized Japanese *karibari* drying panel. Paper objects may not lie perfectly flat even after treatment since paper naturally undulates as it responds to environmental fluctuations.

HOUSING

Once an object has been treated, it should be properly stored in an archival folder or other enclosure. Archival folders and boxes come in various standard sizes but can also be ordered in special sizes as needed. Polyester film folders and L-seals are also available for especially fragile objects. L-seal enclosures that are heat sealed on two adjacent edges are preferred over those sealed on three edges because they make insertion and removal of documents easier and safer. Special housings such as matting, framing, and polyester film encapsulation also give extra protection to objects. In some instances, these enclosures eliminate the need for more invasive reinforcement procedures such as lining.

Polyester Film Encapsulation

Depending upon how often objects are handled, this method of protection and reinforcement may be the most appropriate for archival research materials, as it provides excellent protection during handling. Encapsulation is done by sandwiching the object between two sheets of polyester film (Melinex), usually 3 or 4 mil thickness, and sealing the film at all edges. Conservation laboratories have special equipment for sealing the film ultrasonically or with heat. Because polyester carries a static charge, encapsulation is not recommended for materials with loose, flaking media, nor should it be used for acidic papers. It has been demonstrated that the deterioration of acidic materials is accelerated by encapsulation, and leaving corners of the encapsulation open has little if any effect on this problem. In some situations, the need to protect materials during handling may outweigh this concern. Conservators recommend including buffered or MicroChamber paper in an encapsulation behind an acidic artifact if it could not receive an alkaline buffer during treatment.

Matting

While many museums routinely use mats for storage of prints and drawings, this type of housing is especially suited to works of art or artifacts intended for framing. Mats are usually composed of a window and backboard of 4-ply 100 percent ragboard or lignin-free archival board. The object is attached to the backboard with hinges of Japanese paper and wheat starch paste or with corner supports or edge strips. The window mat provides separation of the object from the glazing in a frame or from the next mat in a stack when stored in Solander presentation boxes or flat files. If there is an inscription on the back of an object, a second, smaller window can be cut into the backboard to reveal the information. Matting protects study collections when viewing by researchers is necessary.

Framing

Once matted, an object can be safely sent to a framer for a new frame or it can be returned to an existing frame. If an existing frame is reused, it may need alteration to make it acceptable from a conservation

point of view. For example, if the frame fits so tightly that the edges of the object come in contact with the wood, the frame opening should be enlarged or lined with a barrier material. Some frames with shallow openings must be deepened to accommodate the total thickness of a mat, the glazing, and the backing layers needed to protect the artifact. Frames can be made deeper by building up their back with strips of wood screwed in place. Ultraviolet-filtering acrylic or glass is recommended as a glazing. Acrylics such as UF-3 Plexiglas carry a static charge, so they are not appropriate for pastels or other objects with flaking or powdery media.

For further information about matting and framing, see the NEDCC Preservation Leaflet 4-10 "[Matting and Framing for Works on Paper and Photographs](#)."

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