WERNER HAUN AND JODY BEENK
DISCUSSION GROUP CO-CHAIRS

Library Collections Conservation Discussion Group 2010: Conservation in the 21st Century: Revisiting Past Practices and Their Evolution in Institutional Settings

ABSTRACT

The Library Collections Conservation Discussion Group (LCCDG) of the Book and Paper Group was pleased to present "Conservation in the 21st Century: Revisiting past practices and their evolution in institutional settings" at the 2010 AIC Annual Meeting. The theme for the session was inspired by the AIC Annual Meeting theme, "*Conservation Continuum—examining the past, envisioning the future*." The session co-chairs, Werner Haun and Jody Beenk, recruited speakers to present treatment techniques and practices for library collection materials as they have been applied, modified and/or maintained in institutional settings over time. Following the presentations, the co-chairs moderated a lively discussion period.

SUMMARY OF PRESENTATIONS

ELIZA GILLIGAN

SHRINKING RESOURCES? INVEST IN THE DECISION MAKING PROCESS!

Ms. Gilligan began her presentation by describing the preservation workflow at the University of Virginia (UVA) Library. Typically, books in need of conservation treatment were identified by the staff of the circulation department and housed in a basement room that rarely received visitors. This made it easy for staff to disregard the books, and research related to treatment decision-making was time consuming. The end result was that book trucks tended to back up, creating a daunting backlog of work. With shrinking budgets, meaning fewer staff hours and supplies, it was difficult to address this problem. In addition, there was increased pressure throughout the library to demonstrate cost-effectiveness of the program.

With the help of a part-time staff member transferred from another department, the UVA Library has been able to invest in the preservation review process without hiring additional library staff. The Preservation department developed this staff liaison position to do the legwork on cost benefit, and to follow up with subject selectors to make sure that decisions are made in a timely manner. Ms. Gilligan described the new workflow and the specially designed form they use to track progress. This process has resulted in increased collaboration with other departments, raised awareness of the overall condition of the library collections, focused the treatment program on books most needed in the collection, and fostered understanding that the preservation department is doing it's very best to make cost-effective choices. The selection form was provided as a handout at the discussion session, and is included in this publication. (See handout 1.)

Eliza Gilligan, Conservator for University Library Collections, University of Virginia Library

FLETCHER DURANT

DIGITIZATION-DRIVEN LARGE-SCALE TREATMENT PROJECTS: OLD VOLUMES WITH NEW NEEDS AND CONSIDERATIONS

Mr. Durant's presentation illustrated a case study for large-scale, digitization-driven conservation projects of non-traditional materials. In 2009, with support from the National Endowment for the Humanities (NEH), an ambitious project involving extremely fragile Chinese rare books was undertaken by the New York Public Library (NYPL) that resulted in increased access to this special group of materials. The project included cataloging, conservation treatment, and digitization of a selection of rare Chinese manuscripts and printed volumes from the NYPL's research collections. Six diverse titles, composed of 93 volumes, deemed to be the most historically important of the group, were selected for conservation

This open discussion took place on May 13, 2010, during AIC's 38th Annual Meeting, Milwaukee, WI. The moderators organized the panelists, led the discussion, and recorded notes. Readers are reminded that the moderators do not necessarily endorse all the comments recorded and that although every effort was made to record proceedings accurately, further evaluation or research is advised before putting treatment observations into practice.

treatment before digitization. These volumes include various traditional Chinese binding styles and materials.

The selected volumes also reflect a variety of prior intervention decisions. In 1935, curators had decided that the traditional format was problematic. The volumes, as was often the case with Asian materials in Western collections, were treated like pamphlet volumes. They were bound together into multi-volume sets using standard buckram bindings. Two sets of 1000-page volumes were created, and some larger volumes were treated as single volumes. Later the volumes exhibited extensive damage in the gutter, and the bindings were too tight to allow for access. Later, in 1991, with a grant from the Luce Foundation, 255 volumes were treated and recased into library bindings and placed into drop spine boxes. One volume was taken apart to have a photocopy reproduction made, and a full conservation treatment was done at the time.

Over the Library's hundred-year history, evolving conceptions of the book as object influenced prior treatment decisions. However, for this project Mr. Durant, working with the curator, came to the conclusion that it was crucial that all volumes be returned to more historically appropriate structures to be more sympathetic to the original structure as well as assist in the digitization work flow. Due to concerns over issues with pagination, it was decided that the volumes would be treated and bound prior to digitization. The conservation work was broken into three parts: lifting and treating areas in gutters where previous mends had lifted; minor treatment on two accordion bindings included mending, hinging and pigment consolidation; and binding, washing, and select mending of 10,000 leaves that were ultimately rebound into 45 fascicles. Mr. Durant also created custom book cradles to accommodate the Asian-style stab bindings during digitization.

Mr. Durant found that as conservators increasingly manage projects that confound normal workflows, they need to balance curatorial requirements, digitization needs, and handling and capture issues in order to ensure sympathetic and successful treatments within a demanding timeline. (See handout 2.)

Fletcher Durant, Project Conservator, The New York Public Library

ANN CARROLL KEARNEY

THE USE OF PAPER AS AN ALTERNATIVE TO LEATHER IN BOOK RESTORATION IN UNIVERSITY LIBRARIES' PRESERVATION DEPARTMENTS

Many libraries and archives do not routinely use leather in their book conservation treatments, either due to the high cost of leather or the problem of inherent vice associated with leather as a material. Consequently substitute repair materials are often employed. Following the example of Don Etherington in his use of Moriki paper, a number of University Libraries' Preservation Departments have adopted the use of Japanese papers as alternatives to leather in conservation procedures. Ms. Kearney developed and conducted a survey of Preservation/Conservation departments. She solicited information on the use of Japanese papers for such repairs. The survey asked about the types of Japanese paper being used, the reasoning behind paper selection, and the identification of ongoing issues with this usage. Ms. Kearney will be analyzing and evaluating the data, and would like to draw conclusions based on these findings. Her hope is that this study will fill an unmet need for documentation of the use of both leather and paper in university conservation labs. In addition, it will offer groundwork for expanding the alternatives for materials and procedure selection in the conservation of leather volumes. (See handout 3.)

Ann Carroll Kearney, Collections Conservator, University at Albany

GRACE OWEN AND SARAH REIDELL

SYNTHETIC LEATHER FOR BOOK REPAIR

A novel treatment system is being developed at The New York Public Library's conservation laboratories for the conservation treatment of leather bindings. Ms. Owen began the presentation by describing the background of 'synthetic leather'. After years of working with limited resources and time for performing complete leather book conservation treatments, she looked to other conservation professionals for alternative treatment ideas. Book conservation treatments often incorporate paper, cloth, or a combination of both when attaching boards or replacing lost or badly damaged material. These repairs are met with varying success at creating a new surface that truly blends with and is sympathetic to the original material. When making a fill or repair, objects and painting conservators routinely use casting techniques to capture the surface texture of an object. Drawbacks to simply adopting the methods used in other areas of conservation, include the fact that the newly cast pattern is often created directly from the original object, and it is usually applied to the original with either heat or pressure, it is inflexible, and the pattern capture from the object requires the use of solvents and a fume hood. Some drawbacks to the book conservation technique are lack of strength and durability, mends are more noticeable, and there can be problems with adhesion. The technique being developed at NYPL is a combination of the two repair procedures mentioned here. By creating a cast from on a surrogate piece of leather, a repair material is created that can be attached to the object. Ms. Owen went on to describe the components of a composite material made of acrylic gel medium, additives, and acrylic paint. NYPL conservators have experimented with reinforcing substrates of paper,

woven polyester, cloth, and leaving the material free of any backing. The technique uses a silicone rubber mold created using surrogate leather to define a texture. A library of molds can be made from leathers with different grain patterns. The molds can be reused indefinitely. Ms. Reidell described the process of using the silicon molds to create the repair material. Heavy body acrylic paints are mixed to match the color of the leather being mended then they are mixed with gel medium and applied to the mold with a spatula. A substrate may be adhered and the material attached using different adhesives—such as starch, vinyl and acrylic—which may be heat or solvent activated. The mends produced with this 'synthetic leather' are less invasive, can be extremely thin yet strong, and visually more compatible than traditional treatments with leather or toned Japanese papers. This technique is simple, uses readily available materials, does not require the use of a fume hood, and is inexpensive. It will require more testing but is a logical step forward from existing (and accepted) book conservation practices. (See handout 4.1–7)

Grace Owen, Senior Conservator, The New York Public Library for the Performing Arts

Sarah Reidell, Associate Conservator, The New York Public Library, Goldsmith Conservation Lab

GARY FROST

CONTINUING ROLE OF PRINT COLLECTIONS IN A CONTEXT OF THEIR DIGITAL DELIVERY: PRESERVATION RISKS, RESPONSE, AND ACTIONS

Use of research library collections is shifting from physical circulation to digital reformatting and screen delivery. Does this suggest a continuing role of physical collections or does screen delivery inherently suggest print disposal? Mr. Frost's presentation suggested that there is a growing interdependence of physical and digital collections. He described attributes of print books, such as fixity, mechanical navigation, persistent re-access across time, and the self-authenticating nature of the print book, and how these all pair nicely with screen attributes of live content, automated search, cloud repository, and electronic delivery. Mr. Frost went on to discuss actions they have taken at the University of Iowa Main Library to advocate for this interdependence, and for a continuing role of print collections. For example, they created a Print Alcove where new print acquisitions are displayed, print newspaper machines, a Zine Machine, as well as a Columbian Press (1843). In addition, they are promoting the concept of a Print Master collection. Currently, this collection consists of original brittle books that have been replaced by preservation photocopies. The library also sponsors and hosts short workshops and longer for-credit seminars that investigate the future of the book. (See handout 5.1–4.)

Gary Frost, Conservator, The University of Iowa Libraries

DISCUSSION SESSION

Immediately following the final presentation, the co-chairs opened the discussion period for comments and questions/answers. Questions and comments from the audience are summarized and paraphrased below following the order of the presentations.

SHRINKING RESOURCES? INVEST IN THE DECISION MAKING PROCESS!

Q: When you say circulation time, what is the time frame for the books?
A: Ms. Gilligan explained that on-line records for the books were uploaded in 1996, and they were able to look at circulation records from that period on. They also rely on the knowledge of the staff at the departmental libraries to have a sense of the use of various books and collections.

SYNTHETIC LEATHER FOR BOOK REPAIR

Q: How thin can you make the synthetic film?
A: Ms. Owen and Ms. Reidell used a caliper to measure the thickness which was averaged 0.006in, about twice as thick as many mending papers. Basically, you can make it as thin as any paint layer.

Q: Have you found that use of bone folder diminishes surface texture?
A: It does withstand the pressure. Previously, BEVA was tried but it did not create the desired texture. Ms. Owen searched for materials that would accept pressure and low heat. The acrylic gels used have a higher melting point than what would be used on a tacking iron for a rare book, and was found to be the most effective material.

It was explained that in the NYPL lab they often use short hand for describing various materials. So far they have been calling this material *pleather* or *archive-a-hide*. However, since the use is not limited to leather bindings, and there are plans to experiment with the material to repair cloth Publisher's bindings, they would like to come up with a catchy new name, and are interested in suggestions.

Q: Has this technique been used for suede textures?
A: No, thus far Ms. Owen and Reidell have been developing and trying different mends, and for more exact comparisons they have only been using one grain pattern.

Q: Was leaf casting considered for mending?
A: It was considered only briefly. The leaves were too difficult to handle when wet because the long fiber paper was too thin and brittle. Out of 10,000 pages, 4,000 needed to be lined. This gave strength to the whole sheet rather than adding materials to essentially the weakest part of the page.

ACKNOWLEDGMENTS

The co-chairs of LCCDG wish to express their gratitude to speakers Eliza Gilligan, Fletcher Durant, Ann Carroll Kearney, Grace Owen, Sarah Reidell, and Gary Frost for their presentations and handouts. Their willingness to share their experiences in institutional settings is greatly appreciated. The co-chairs also thank Laura O'Brien Miller and Marieka Kaye for coordinating a complementary discussion session and helping with handouts and session information.

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Preservation Review

Number of patron circs:_____

Replacement available: Y N

Paper copy:

Same edition: Y N

Digital copy:

Other copies available at UVA:_____

Other editions available at UVA:_____

Number of copies in WorldCat: _____

Does UVA have the other volumes in series?

Types of damage:

Brittle

Graffiti

Can't bind

Water damage

Text block separated from case

Other

Binding significant? Y N

Recommended action(s) SL initials

Box

Withdraw

Purchase additional copy

Facsimile

Repair

Other

Name of subject librarian:

University of Virginia Libraries

Preservation Review

Number of patron circs:_____

Replacement available: Y N

Paper copy:

Same edition: Y N

Digital copy:

Other copies available at UVA:_____

Other editions available at UVA:_____

Number of copies in WorldCat: _____

Does UVA have the other volumes in series?

Types of damage:

Brittle

Graffiti

Can't bind

Water damage

Text block separated from case

Other

Binding significant? Y N

Recommended action(s) SL initials

Box

Withdraw

Purchase additional copy

Facsimile

Repair

Other

Name of subject librarian:

Handout 1.

Digitization-Driven Large-Scale Conservation Projects: Old volumes with new needs and considerations

Fletcher Durant
The New York Public Library Goldsmith Conservation Lab

Project Outline: In July of 2008, the New York Public Library was awarded a Preservation and Access Grant by the National Endowment for the Humanities to catalog, preserve, digitize, and make accessible on the web a selection of rare Chinese language materials. Six titles were selected for conservation treatment, including two illustrated accordion volumes, a series of rare printed pamphlets from the T'ai P'ing Rebellion (1850-1864), and three manuscript titles from the James Legge Collection. The treatment goals for these items were two-fold: 1. to provide for the long-term preservation of the materials and 2. to allow for safe and complete capture during digitization.

Prior Interventions: In addition to the research value of the materials selected for treatment, the six titles also displayed the varied history of the treatment of East Asian bound materials in the NYPL's predominantly Western collections through the physical evidence of at least two prior interventions. The first intervention ca. 1935 appears to have integrated the materials into the the traditional bindery work flow for Western monographs and pamphlets, resulting in library bound volumes and collections of pamphlets. A second intervention took place under the auspices of a Luce Foundation grant, 1988-1992, with the decision-making clearly influenced by Peter Water's philosophy of "Phased Conservation." 255 volumes were re-cased and housed in drop-spine boxes. 1 title was considered for preservation re-formatting, but the original stab-sewing prevented reproduction. The 24 volumes of the T'ai P'ing Rebellion Pamphlets were provided with a single-item level treatment of disbinding, washing, lining, and rebinding in historically sympathetic stab-sewings.

Lessons:

1. Oversewing obscures text in gutters, restricts openings, and creates a breaking edge for even flexible papers.
2. Use as light a weight of lining paper as possible to encourage flexibility in gutters.
3. Extending the lining on shattered spine edges provides locations for the lining to separate.

Current Treatments: With preparation for digitization as a primary consideration in treatment, the two illustrated accordion volumes and T'ai P'ing Rebellion Pamphlets received minimal intervention for stabilization prior to digitization. The remaining three titles, containing 45 bound volumes and 10,000 pages of brittle and discolored Chinese manuscripts are receiving a full treatment including disbinding, washing, lining (as needed), and rebinding in historically sympathetic bindings.

Issues to consider in large-scale project planning:

1. Tracking unpaginated Chinese manuscript leaves.
2. Allowing for digitization of disbound materials.
3. Efficiency of work space. Every steps adds up.
4. Materials, as much as time, serve as a limiting factor in quantity of treatment.

Handout 2.

THE USE OF JAPANESE PAPERS IN THE REPAIR OF LEATHER VOLUMES IN ARL ULIBRARIES PRESERVATION DEPARTMENTS SURVEY RESULTS OUTLINE

Ann Carroll Kearney

LCCDG Presentation AIC Annual Meeting 2010

Survey List developed by reviewing ARL University Libraries identifying Level 3 procedure performance

Surveys Distributed: 68

Surveys returned: 32 (3 N/A respondents)

1. **Do you use paper instead of leather when performing leather repair procedures?**

   Yes: 15 No: 5 Often/V.Often: 3 Sometimes: 2 Occasionally: 3 Rarely: 2 Minimally: 1 Only: 1

2. **In which procedures do you use it?**

   Joint repair/board reattachment: 9 Reback: 8 Hinge repair: 4 Spine repair: 3
   Corners: 2 Endcaps: 1 Tears: 1 Case reconstruction: 1

3. **What type/types of paper do you use? (Several respondents provided more than one answer)**

   Japanese tissue (unspecified): 17 Moriki: 10 Kozo: 4 Hiromi Kozo: 2 Barrett: 1

4. **What are your criteria for Questions #3?**

   Strength: 8 Color: 7 Weight: 7 Flexibility: 6

5. **Do you size, tone or line the paper? (10 Participants combined this answer with following (#5) answer)**

   Yes: 19 No: 2

6. **If "Yes," could you identify the products or items used?**

   SIZE:
   Klucel-G: 5 SC6000: 4 PVA/Wheat starch: 2

   TONE:
   Acrylics: 14 Golden Acrylics: 5 Watercolors: 4 Colored Pencil: 2
   SC 6000: 2 Pastel: 1 Dr. Martin's: 1

   LINE:
   Linen: 8 Japanese Tissue(unspecified): 8 Cotton: 3 Tyvek:

7. **Do you use a consolidator, i.e., SC6000? What do you use, under what circumstances do you use it, and to what end?**

   SC 6000: 12 Klucel-G: 5 SC 6000+KG: 2 SC 6000+ETOH: 2 Cellugel: 2

8. **Can you suggest advantages/disadvantages/comments about using paper instead of leather in book repair procedures?**

PROS:	CONS:	COMMENTS:
Easier: 10	Color fades: 2	"Don't Like Using": 1
Quicker: 9	Not durable: 2	"no paring": 3
Stronger: 7	"Not leather": 2	"very few minuses": 1
Less expensive: 6	Felting issues: 1	"can be done on short notice": 1
Minimal training: 4	Handling issues: 1	"don't use on pre-1850": 1
More stable: 3		"not routine for circulating collections": 1
Fewer supplies needed: 3		

Handout 3.

CAST COMPOSITES: A SYSTEM FOR TEXTURING REPAIR MATERIALS IN BOOK CONSERVATION

Grace Owen and Sarah Reidell

ABSTRACT

This paper presents the development of an experimental conservation treatment system that replicates the patterns of original covering materials on bound volumes. The cast composite system has potential application in simple and complex treatments of bound volumes. The technique uses supplies widely used in book conservation and adapts surface casting methods common in objects and paintings conservation. Silicone molds are used to replicate the surface textures of original covering materials on bound objects. A blend of acrylic gel, additives, and paint media is specially formulated to retain the surface texture from the silicone mold. The textured cast is then used as a repair material either alone as a film or with supporting substrate(s) like paper, non-woven polyester, or textile. Features of the original materials can be matched by adjusting components of the cast composite system using the customization tips for replicating surface textures, original finish, opacity, and color. Cast composites are easy to create from affordable materials readily available from conservation and artist material suppliers. Completed cast composites are less invasive, thinner, and visually more compatible than bound volume repairs with new leather or Japanese papers.[1]

INTRODUCTION

Cast composites are a key component of an experimental conservation treatment system in development at the Barbara Goldsmith Conservation Laboratory of The New York Public Library. The system can produce repair materials that are suitable for bound volumes covered in almost any kind of textured material. Repairs made with the system incorporate supplies widely used in book conservation, adapting surface casting techniques common in objects and paintings conservation.

The methods and procedures for producing silicone rubber molds and cast composites are presented in conjunction with customization tips. Impressions are taken from surrogate material to make a mold that closely matches the original covering surface. The acrylic media are blended to reproduce the color, sheen, and opacity of the original covering, then cast on the textured mold. Layered application of the blend produces aesthetically superior repair materials. Cast films can be used alone or as composites with support substrates like paper, non-woven polyester, or textiles. Without a support layer, they can be used to fill abraded areas of a covering material. Cast films with supports can be used to repair joints, reattach boards, and fill losses. Substrates can be embedded into the acrylic blend directly during the casting on the mold or adhered later to the dried film.

As a repair material, cast composites can be used to compliment a variety of common book treatments. The advantages of the cast composite system include affordability, availability, low toxicity, and increased aesthetic matching of original covering materials. By modifying the components in the acrylic blend, the system can be utilized for a range of simple to complex treatments. Cast composites can be less invasive, thinner, and visually more compatible than traditional repair materials. The cast composite system can be scaled up or down to fit the needs of special or general collections.

BACKGROUND

There are many conservation techniques for addressing the physical damage often found in bound volumes, including: board reattachment with threaded tackets; long-fibered kozo paper or cotton-linen textile extended spine linings; rebackings with leather or textile; toned paper joints; or paper infills. Methods to maximize visual unity between repair and original materials include toning or dyeing repair components and inpainting.

Current conservation techniques for repairing damaged three-dimensional objects can be of limited use when applied to book conservation. Conservators routinely capture and replicate surface textures on three-dimensional objects, typically using a mold system (O'Donnell 1997, Nieuwenhuizen 1998, Sturge 2000, Kronthal et al 2003, Kite and Thomson 2006). The mold is then used to texture infill material placed in the lost area while soft. Textures can also be transferred to infills with heat. The fill material is often colored before and inpainted after the textured repair is in place. Heat application of a pattern to a mend on a book is difficult and often not possible in crowded shoulder joints and caps.

Texturing techniques described in other disciplines such as paintings and objects conservation have not been widely adopted by the book conservation community, in part due to concerns about physical compatibility and toxicity. Most of the objects treated in this manner are static. Bound materials differ from other kinds of three-dimensional artifacts because they are dynamic. The use of BEVA 371 resin solutions, advocated in the other disciplines for filling losses, requires solvent-extraction units to which many book conservators do not have routine access. BEVA

film, which does not need solvents and can be heat activated, is difficult to incorporate into book conservation treatments because it can be hard to melt and color, and must be textured after application.
The historic bridge between conservation and bookbinding might have influenced the use of like materials: leather to repair leather covers, and cloth to repair cloth bindings. Using leather as a repair material is sympathetic to the original but is not always desirable because of concerns about cost of materials, the need for highly developed hand skills, and inherent vice. Toned paper repairs are a common and very useful technique for treating bound materials with lost or damaged leather (Etherington 1995), but there are drawbacks. Chief among these are problems of durability and aesthetic compatibility. More recent techniques that take advantage of the reactivation properties of certain acrylic adhesives such as Lascaux 498HV overcome some of the physical drawbacks to toned paper repairs, but still have dissimilar surface textures to the original covering material (Anderson and Puglia 2003).

CAST COMPOSITES
In light of these issues, we have experimented with adapting the pattern-capturing techniques used by paintings and objects conservators, and incorporating them with common book repair methods into a cast composite system. “Cast composite“ is a term borrowed from materials science to describe a product composed of two or more substances of very different physical characteristics whose performance is significantly better than the performance of each substance individually. The result is a strong lightweight material with a custom-colored textured surface which can be used with supporting substrates as an alternative to leather or cloth for the repair of bound volumes.
For our technique, a silicone mold is created to bear the impression of the surface of a surrogate leather or textile. Acrylic paints are mixed to match the original color and sheen of the covering material, and then added to a combination of acrylic gel medium and additives. This formulation is spread onto the textured mold in at least two thin layers. Acrylic films can be reinforced with one or more supporting layers of fibrous substrates, to become cast composites.

SURFACE TEXTURE
Mold kits are used in many different areas of everyday life such as the dental or food industries. The Rebound 25 Smooth-On Silicone Rubber mold kit is inexpensive and readily available. Molds can be reused indefinitely with proper care. Rebound 25 was chosen because it is a room temperature vulcanizing (RTV) product that sets in ambient laboratory conditions; it has no toxic fumes, and has good tear resistance.
There are three options for replicating a given surface texture using Rebound 25, including an impression taken (1) from a surrogate; (2) from the book; or (3) from a book of no value with a similar pattern. The first method, taking an impression from a new piece of leather with a similar grain pattern, a textile with similar weave/weft size, or other materials, is recommended. The second method is risky because the liquid silicone rubber can penetrate and discolor porous surfaces. Additional physical damage can occur when removing the dried silicone rubber from the original material, particularly if there is unconsolidated or deteriorating leather. Finally, using a non-collection book of little to no value such as the third option requires money, time, and attention. Another drawback for both the second and third options is that the size of the finished mold is limited to the surface area of the cover.
Traditional bookbinding materials such as leathers and book cloth are ideal, but are not the only sources for textures. Patterns on many common materials such as synthetic leather handbags, textured VHS plastic boxes, ribbed fabric, ribbons, sandpaper, or polyethylene foam can be used for making molds. These materials offer a wide variety of grain or weave patterns. Many impressions can be taken from the same textured piece. New leathers can be plated, stamped and finished using a variety of bookbinding methods to approximate historical decorative techniques. Soft surfaces with nap such as reverse calf or velvet are not suitable for the cast composite system.

TECHNIQUE: SILICONE RUBBER MOLD
For the purposes of this article, the mold making method will refer to surrogate leather that approximates the original surface of a volume bound in full tanned leather. The method for creating a mold that captures the surface texture of embossed or patterned book cloth is almost identical to that of hide leathers. Molds created from original or deaccessioned bound volumes may represent a valid treatment option but will not be discussed further due to the potential damage from liquid silicone, as described above. There may be other mold kits available that can be used on original material without staining.
The process requires a walled tray with straight sides of at least one inch in height. The 15 x 6 x 2” Rubbermaid plastic drawer organizers are ideal for this purpose and their size approximates the average height and spine width of most bound volumes in most collections. A single-use tray could also be constructed out of binder’s board and customized to match the dimensions of larger volumes.

Handout 4.2.

The surrogate leather must be kept flat for the duration of the mold fabrication. A piece of binder's board is trimmed so that it will fit snugly in the bottom of the tray, abutting all sides. The leather is fully adhered to the binder's board with a modified polyvinyl acetate resin emulsion (PVA) or pressure sensitive film. Lifting tabs can be created by attaching a thin strip of polyester film with double-sided pressure sensitive tape on the verso of the panel. The panel is placed into the tray (fig. 1).

Rebound 25 has two components which must be mixed together in equal portions in order to solidify properly[2]. Molds should have a final thickness of approximately 1/8 to 1/4 inch. A tip from the manufacturer's website helps to determine the volume of silicone liquid needed. Uncooked rice is poured into the tray to the desired thickness of the finished mold. The rice is transferred to a measuring cup to record the total volume of silicone required. The total volume is then halved to determine the required volume of each component liquid.

An equal amount of each liquid is poured into a container and mixed until thoroughly blended (refer to package directions for more information). A disposable stiff-bristled brush is used to paint a thin layer of silicone onto the leather surface. This step reduces the formation of air bubbles. The rest of the silicone rubber is slowly poured into the tray (fig. 2). The tray is tilted so that the silicone liquid flows over the leather completely and evenly. The bottom of the tray is rapped onto a flat surface several times to force out any additional trapped air. The tray should dry undisturbed on a level surface for at least 6 hours or overnight. Minus drying time, the mold-making process should take 10 to 15 minutes.

The lifting tabs can be used to pull the panel out of the tray. The silicone mold is peeled away from the leather (fig. 3). It should separate without difficulty. Sticky residues left on the tray can be removed with isopropyl alcohol and paper towels. The cleaned tray and leather panel should be saved and can be reused for additional mold making. The silicone mold can be used immediately and reused many times.

CAST COMPOSITE FORMULATION

Cast films are a blend of Golden Heavy Body Acrylic Colors, Heavy Gel Medium, GAC 200 and GAC 500. Golden has a long track record of collaboration and open dialogue with conservators (Bernstein and Evans 2008). Golden Heavy Body acrylics are widely used in conservation because they include the fewest additives and have high pigment loads (Golden n.d.). They come in both jar and tube, but tubes are preferred for easier measuring. The acrylic paint, combined with the Heavy Gel medium and additives, creates the film, which captures and holds the surface texture. Gel mediums are available in a range of finishes. The semi-gloss and matte work best to match original leathers and book cloth. GAC 200 and GAC 500 are acrylic polymers that modify the paint/gel properties, increasing film hardness and reducing tack.

Reinforcing substrates such as paper, non-woven polyester, or textiles can be embedded into the wet acrylic film during the casting on the mold, or can be adhered later to the dry cast film. Long-fibered kozo papers are the most versatile because they are available in a variety of thicknesses from many suppliers. Suitable textiles such as unbleached, unsized airplane linen or cotton muslin can be used for more robust repairs.

TECHNIQUE: CASTING

The most useful formulation for making cast films is a ratio of 1 part (by volume) Golden Artist Colors (GAC) Specialty Acrylic Polymer 200 additive, 1 part Golden Artist Colors (GAC) Specialty Acrylic Polymer 500 additive, 2 parts Golden Heavy Gel medium (matte or semi-gloss), and 4 parts Golden Heavy Body paints color-matched to the original covering material. This is a slight adjustment from the ratio recommended during the Library Collections Conservation Discussion Group of the 2010 AIC Annual Meeting.

The characteristics of each component can be compared (fig. 4) and if desired the basic formula can be adjusted to customize the result for the intended application. Many formulations of the acrylic components are possible and will work as repairs with subtle differences in the final product. Tips on customization of the formula are included in a later section. Most films created for silicone molds made in Rubbermaid trays required no more than 1 ½ to 2 teaspoons (or about 8-10 mL) for full coverage.

The custom-mixed paint is added to the selected volume of Heavy Gel medium, GAC 200 and GAC 500. A clear container will help to determine that all three components are distributed in a homogeneous mixture. Half of the blend is spread onto the silicone mold with a wide, flexible silicone spatula (fig. 5). Long even sweeps will help to fill all of the depressions in the mold and create a uniform film. The remaining gel mixture should be covered and set aside. This first layer should dry before proceeding. A hair dryer may be used to speed drying time.

The remaining acrylic blend is spread onto the mold with the spatula. At this point in the process there are many options for customization. Further information is presented in the customization section, but the general procedures are presented here. Varying the color and transparency of the layers applied to the mold will produce aesthetically superior repair materials.

The chosen support can be laid onto the second layer. It should be done while the acrylic blend is still wet. The support is dropped onto the surface and pressed into the blend to ensure complete bonding and detail capture without striking through (fig. 6). The blend should partially penetrate, but not saturate, the support. The cast composite (whether film alone or film and support) should dry for 8-10 hours depending on ambient room conditions. If the casting is removed from the mold too soon, its patterned surface may be compromised.
The dried film or composite is removed by placing the mold face down on a work surface, rolling it and peeling the film away from a corner. The material will continue to cure until dried fully for 24 hours or longer before use. The mold can be cleaned with soap and water then towel- or air-dried. Abrasive pads will scratch the surface of the mold.

TECHNIQUE: CAST COMPOSITE REPAIRS
Incorporating cast composites into standard treatment practice is simple with the preparation of the repair and selection of flexible adhesives. Bound volumes should be cleaned to reduce surface grime. Leather bindings should be consolidated to prepare all surfaces for treatment. The CCAHA "red-rot cocktail" (a 1:1:1 solution of SC6000 acrylic wax emulsion, Klucel G 2% in ethanol, and ethanol) works well (Haines 2002, Brewer 2003).
After replicating the covering material texture on a damaged book (fig. 7) and creating a cast composite, the cast composite is trimmed or torn to the desired dimensions (fig. 8). A needle or scalpel can be used to shape the mend and create irregular edges which help to visually integrate it with the original covering material. Films without a supporting substrate are not strong enough to use in areas of a book that require structural reinforcement. They are better used as cosmetic fills where the original surface layer is lost or abraded.
Cast composites create less obvious repairs when the support is removed along the edges of the torn repair strip, exposing the cast film (fig.9). Paring and sanding are two of many techniques to create an extended edge and remove visible fibers on an irregularly shaped fill. Pressure sensitive tape can be used to pull away paper fibers along the edges. A damp swab can be used to push and rub away a narrow margin of the paper substrate on the verso of the cast film along the torn edge. Textiles can be cut and threads pulled from the edges to create a shaggy soft edge. Adhesives used to attach the mend to the book will soften the edge of the cast film after application, allowing it to conform and blend into the surrounding texture on adjacent covering material (fig. 10).
Adhesive selection is crucial to successful repairs with cast composites and should be based on desired repair characteristics. Acrylic adhesives provided the best results. Lascaux 498 HV is used by many conservators to apply the solvent-set toned Japanese paper hinge repairs (Anderson & Puglia 2003). Early testing using Lascaux 498HV adhesive, thinned with water, was disappointing. The nature of the cast composite is to slightly rebound after flexing; this caused Lascaux 498HV-adhered mends to pull away from the leather when the cover was opened. Many conservators treating leather use adhesives that remain slightly tacky after drying, such as Rhoplex N-580 and Lascaux 360, prompting concerns about shifting mends, blocking, and adhesive flow. These issues are especially pertinent for books which are often shelved tightly.
A mixture of Lascaux acrylics (1 part Lascaux 360HV, 2 parts Lascaux 498HV, and 2 parts deionized water by volume) worked well as an adhesive for adhering cast composites. Solvents are not recommended to dilute the adhesives as they can soften the textured surface of the cast film. The Lascaux mixture works best applied in thin layers. The first layer should air-dry, creating a barrier. The second coating of the Lascaux mixture is applied and the cast repair is adhered to the book. Reactivation of the dried adhesive is possible with heat or with an organic solvent (from the verso). Mends immediately conform to the volume and require little weight and pressure to set. Theoretically, these repairs can be removed with solvent if necessary, but the book surface could be altered. No matter how benign the adhesive, the possibility of damage is always present when working with fragile leather.
Reversible PVA (neutral pH) is another adhesive that adhered the cast composites well. It can be applied wet, or the dried adhesive can be water re-activated. The working properties were just as favorable as the Lascaux mixture.
After selecting and applying the adhesive to the verso, the mend is put in place and dried undisturbed to avoid shifting. Adhesive residues can be cleaned with a damp cotton swab. The head and tail of joint repairs should be turned at a later stage to discourage lifting and shifting.
Heat-setting can be a fast method of preparing and applying cast composite materials. Silicone-coated polyester film barriers can gloss the surface of the cast composite repair when using heat to apply a cast composite. Silicone-coated paper can decrease gloss. Other barriers such as non-stick oven liner cut into strips did not seem to alter the finish of the repair.

CUSTOMIZATION

Utilizing the various components (fig. 4) it is possible to customize the cast composite to modify color, opacity, sheen, decoration, and support substrates. The most successful combinations for realistic and natural-looking composites for leather and book cloth repairs exploit some aspect of all of these characteristics.

Matching the color saturation and hue of the original covering materials is the most challenging aspect of the cast composite system. The opacity/transparency rating of each acrylic color is crucial. The Golden Opacity/Transparency system, a relative ranking with 1 being most opaque and 8 being most transparent, should be consulted to help guide color selection. Layered application of acrylic blends with high transparency ratings (4 or above) produces aesthetically superior repair materials. Changing the color of a subsequent layer (or layers) of the acrylic blend applied to the mold adds vibrancy, avoiding a flat, "painted' look. Radical color differences of the layers can add depth to the dry film. Original speckling can be replicated with acrylic paint on a toothbrush, in an aerosol sprayer, or in an airbrush setup. This is most effective when added after a transparent first layer of the wet blend during the casting process.

Subtle shifts in perceived color can also be achieved by toning the substrate before or after the composite has been made. The support can affect brightness; light-colored muslin will produce a repair material that is lighter than dark linen. The color of a repair can be adjusted after it is adhered to the volume with spot application of acrylic paints as a final treatment step.

Every volume will have a unique sheen that may change after consolidation and surface cleaning. The acrylic polymers tend to be shiny. Products with matte finishes (Heavy Gel Matte medium or Heavy Body Matte acrylic paint) can be substituted to adjust the sheen of the cast repair. The flat look of patterned book cloth, particularly those of the 19th century, is most successfully replicated by increasing the opacity and decreasing the sheen of the acrylic blend applied to the mold. Combining the matte gel medium and matte acrylic paints will result in the flat, dull look that is characteristic of many book cloths.

The properties of the support substrates can be manipulated by applying them in multiple layers. Multiple supports could provide greater variation with wet or heat-set adhesive application and increased treatment options. Layered supports such as non-woven polyester plus Japanese paper could be used as a modified split-flange board attachment for increased strength (Brock 2001). Non-woven polyesters are trickier to use as a support because they require special adhesive selection. BEVA film is often used by other conservation disciplines for adhering non-woven polyesters.

CONCLUSION

Cast composites show great promise as a repair material for book conservation treatments. The cast composite system is a low-cost and simple technique that can produce high quality materials that replicate the textures of original coverings. They can be fast and easy to make once the technique is learned. Supplies for the repairs are easy to source and are relatively inexpensive. The system is customizable and opens up a range of techniques for repairing bound materials and matching surface textures.

There are several factors to consider with respect to using the cast composites. The technique should be considered experimental until suitable aging and physical testing can be conducted. Until then, we are reliant on testing carried out to date and product information supplied by the manufacturer. Inherent vice of the object, especially degraded leather, will complicate these issues as it routinely does in book conservation.

The cast composite system can be scaled up or down to fit the needs of special or general collections. Films can be cast in bulk to make a modular system with pre-made films and supports. The time and effort to create cast composites is comparable to similar repair materials like solvent-set tissues. With multiple surrogates and molds, a "library" of textured patterns can be compiled to be readily available for use. Overall, the cast composite system leads to less invasive treatments and more complimentary repair materials for book conservators.

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SUPPLIES

Most supplies discussed in this article are available at common conservation suppliers like Talas (330 Morgan Ave, Brooklyn, NY 11211, http://talasonline.com/) or Conservation Resources (5532 Port Royal Road, Springfield, Virginia 22151, http://www. conservationresources.com); local art stores or internet retailers such as DickBlick Art

Materials http://www.dickblick.com/ or Pearl Art & Craft Supply http://www.pearlpaint.com/; or local houseware supply stores.

Acrylic paints, gel media, and additives
Golden Artist Colors, Inc. 188 Bell Road, New Berlin, NY 13411-9527
http://www.goldenpaints.com/products
Heavy Body Acrylic Colors, 2 oz tubes (art supply store)
Heavy Body Matte Colors, 2 oz tubes (art supply store)
Gel Mediums, Heavy (Semi-Gloss) and/or Heavy (Matte), 8 oz jars (art supply store)
GAC 200 Acrylic and GAC 500 Acrylic, 8 oz bottles (art supply store)

Adhesives
Lascaux Acrylic Adhesive 360 HV (Talas)
Lascaux Acrylic Adhesive 498 HV (Talas)
Reversible PVA (neutral pH) WS3978 (Conservation Resources)

Oven liner
Betty Crocker Clean Cookin' Oven Liner, 23" x 16.25" (housewares store)

Silicone mold kit
Rebound® 25 Smooth-On Silicone Rubber (art supply store)

Textiles
Airplane linen, 54" wide, 100% linen, 6.33 oz/inch^2 (Talas)
Cotton muslin, 44" wide, 100% cotton fabric (Talas)

Tray
Rubbermaid Drawer Organizer, 15" x 6" x 2" (housewares store)

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Handout 4.6.

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NOTES
1. Adapted from presentation given at the Library Collections Conservation Discussion Group, AIC 38th Annual meeting, May 11-14, 2010, Milwaukee, Wisconsin.
2. All safety precautions should be followed as per the manufacturer's instructions.

PRODUCT	CHARACTERISTICS	USE IN CAST COMPOSITE FORMULA
Golden Heavy Body Acrylics	High pigment load. High viscosity. Retains flexibility when dry. Opacity/transparency ratings (Golden n.d.)	Blend paints to match color, hue, and opacity of original materials.
Golden Heavy Gel Medium	Increases body of acrylic paints. Holds peaks from the texture on the silicone rubber mold. Adds dimensionality to the paint mixture without diluting it. (Golden 2007)	Capture and hold peaks from textured mold. Increase film hardness. Select either Semi-gloss or Matte finish to match original surface sheen.
Golden GAC 200 Specialty Acrylic Polymer	Liquid acrylic polymer emulsion that is the hardest and least flexible of GAC acrylics. Increases film hardness and reduces dry film tack. Decreases flexibility when used as major ingredient. (Rice 2004)	Extender additive for acrylic blend to aid in peak hardening and tack reduction.
Golden GAC 500 Specialty Acrylic Polymer	Liquid acrylic polymer emulsion with leveling ability and increased mar resistance. Forms a hard, glossy film. The hardest polymer that is suitable for flexible supports. Mix with acrylic colors to increase film hardness and reduce dry film tack, while maintaining flexibility. Particularly useful for extending acrylic colors with minimal property change. (Rice 2004)	Extender additive for acrylic blend to aid in peak hardening, tack reduction, and flexibility. Adds gloss.

Fig. 4. Comparative table of acrylic component characteristics. Use as an aid for customizing the formulation.

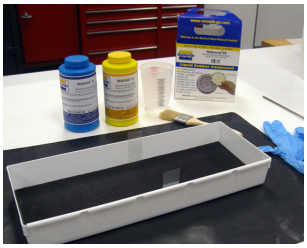

Fig. 1. Rebound® 25 Smooth-On Silicone Rubber components, walled plastic tray, and leather surrogate on prepared panel.

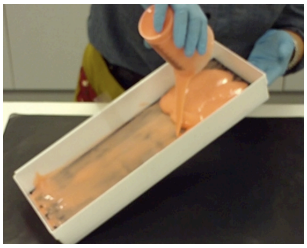

Fig. 2. The remainder of the silicone rubber is poured into the tilted tray.

Fig. 3. The silicone mold is peeled away from the leather.

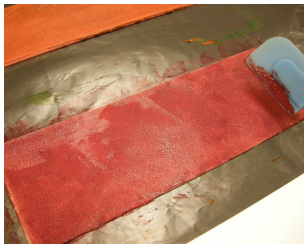

Fig. 5. The acrylic blend is applied to the silicone mold with a wide spatula to create a uniform film.

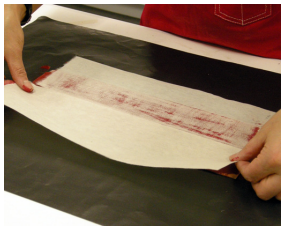

Fig. 6. Japanese paper support substrate is applied to the wet acrylic blend.

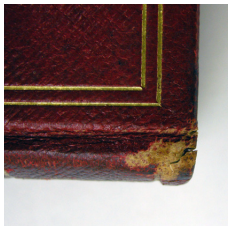

Fig. 7. Sample book, BT. Torn and abraded head cap on sample non-collection item.

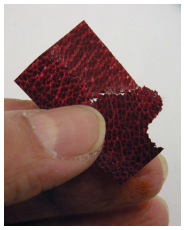

Fig. 8. Cast composite is shaped for repair.

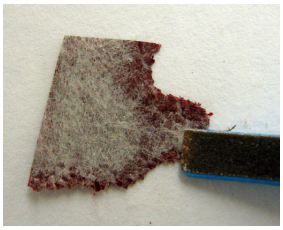

Fig. 9. Cast composite fill is sanded to expose the cast film along the edge.

Fig. 10. Sample book, AT. Fill adhered to head cap with Lascaux mixture.

AIC/LCCG

"Continuing Role of Print Collections in a Context of their Digital Delivery; Preservation Risks, Responses, and Actions"

Gary Frost, conservator of Libraries, University of Iowa

Risks

A cascade of white papers and reports confirm that libries are in a transition to mixed print and screen based services and that this transition is not yet completed (see bibliography). Accordingly, demand for direct access to books is projected to diminish as screen delivery proves more popular. What implactions can this transition have for library preservation and the status of physical collections? As whole sectors, ranging from election tabulations, to music recordings, to financial derivatives, to automotive controls have experienced subtle and then devastating consequence derived from transaction of physical to electronic delivery, will the library collections be next to experience unintended consequence? Do we wish to transmit culture directly or via simulation and is the use and study of print collections now subjected to this negotiation?

Should we dispute growing linkage between certification of digital reprography and discard of print sources? Should we pause to consider the influence of the high density storage paradigm if it proves to diminish the status of physical collections? Should we advocate for certification of print masters alongside certification of their screen simulations? What additional risks of transition can be particular to preservation work flows. Recall that libraries long fulfilled preservation responsibilities without named "preservation" departments. Is preservation a direct corollary of library ownership of collections which is not well suited to an ear of subscribed and leased digital resources?

Responses

What should we do in such a vortex? One option going forward is investment in a logic of the interdependence of print and screen access to better assure sustainability of research library services. In this perspective the physical collections and their screen simulations interplay to provide a cohesive service. Print attributes such as fixity, haptice refinement, materiality, and reliable re-access across time, all pair nicely with screen attributes of immediacy, automated search, electronic delivery, and live content.

We should also certainly defend print attributes in an environment of exuberance over screen attributes. Useful attributes of print navigation, legibility, persistence, authentication and constraint are still essential. Let's review some of these in context with screen delivery.

Navigation
This is the attribute of haptic communication in which the manipulation of the mechanical format conveys additional meaning without distracting comprehension of content. Primate dexterity and a deeply embedded capacity for hands to prompt the mind are fully optimized by the codex mechanism.

Legibility
There is nothing more illegible than a black screen. Network lading and interruption, application, device and platform incompatibilities, battery drain and power requirements impair screen

legibility. Browser default line length and justification distortions reach extremes of legibility. The page is immediately legible.

Persistence
Print is passively persistent and provides both storage and display functions for a single, one-time cost. Screen persistence is not assured due to content decay and mutability, provider interventions or demise and media, software and hardware obsolescence. Fail-safe eye legibility is an exclusive print attribute.

Authentication
Print is self-authenticating with a capacity to sustain continued forensic and bibliographic investigation. The overt nature of print content confirms a positive or negative result for queries. Print content and its material presence is inherently immutable.

Constraint
The constraints of print are attributes. The material constraint eases economies of authorship and production, and packages research and creative investment. Constraints of book design, typography, paper-making, printing and binding assure elegant, efficient delivery to readers. Assured re-reading across time and cultures provides research validity and organization.

Actions

Many enjoyable and crucial actions can be taken to advocate for the interdependence of print and screen collections and for a continuing role of print in a context of their digital delivery. Here are some examples of activities initiated by the Preservation department of the Libraries at the University of Iowa. These include our Print Alcove, our Leaf Master collections and our instructional outreach regarding the future of the book.

Print Alcove
The Print Alcove is situated in a section of the entrance level of the Main Library. This gathering area includes a compelling and attractive display of the new print acquisitions. There is also an array of print newspaper dispensing machines and our cool Zine Machine stocked with student productions. In the very corner, is the bizarre Columbian press (1843). This printing press is an endless prompt of curiosity and an effective billboard for lectures and events of our Center for the Book. The Print Alcove also serves as a demonstration area for our annual, Library sponsored, Book Festival. Hopefully, the Print Alcove gives focus to the Library's interest in the strategic future of tangible collections and the scholarly future of print.

Leaf Master Collection
The concept of a "leaf master" print collection sequestered to act as sources for digital copies is proposed as a component of interdependence of print collections and their screen delivery. To date our "leaf master" collections consists of original brittle books that have been replaced by preservation photocopies. These are shrink wrapped and classified both by shelf mark and year of replacement copy.

The "leaf master" collection implies a further proposal for certification of print masters generally, modeled on certified designation of alkaline paper. While automated certifications of digital repositories are being developed we should also consider the function of print collections, composed of certified copies, which can act to confirm authenticity of screen simulations.

Instructional Outreach

Wide redefinition of the interaction of print and screen books is in progress in fields of diverse as neurology of reading, digital preservation, e-book marketing, and technology of print on demand. Discussion extends from blog rants on the death of the book, to touch-screen haptics, to cloud libraries. Over arching this dynamic is the eulogized role of the physical book and its imprint on the future of cultural transmission.

We produce both short workshops and longer credit seminars which investigate the future of the book in a context of its mixed print and electronic delivery. Students survey issues and experience distinctive affordances of the paper and screen book. The sessions include visiting specialist lectures as well as student presentations. Such instructional outreach is of interest to those in book studies, communication studies and library and information studies. It has also proven popular with bibliophile and continuing education enclaves. Two up-coming Preservation department sponsored seminars are "Future of the Book," Center for the Book , fall 2010 and "Strategic Future of Print Collections in Research Libraries" ALA/ALCTS: PARS and RBMS, June 27, 2010.

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3. **"Faculty Survey 2009: Key Strategic Insights for Libraries, Publishers, and Societies,"** Schonfeld, Roger C., and Hosewright, Ross, ITHAKA S+R, April, 2010. *Graphic display of data from three faculty surveys; 2003, 2006, 2009 indicating trends in faculty support for libraries gauging preference for digital library services*
4. **"Final Report, Provost's Task Force on the University Library,"** University of Chicago, July 2006. *"…it is clear that most of the technologies that today aim to automate or simplify or replace parts of library research do not in fact accomplish what it accomplishes now, but rather do something different to a greater or lesser extent."*
5. **"Florence Declaration, Recommendations for the Preservation of Analogue Photo Archives,"** Kunsthistorishes Institut in Florenz, October, 2009. *This manifesto, subscribed by 271 Archivists, defines the continuing interdependence of digital imaging and analog sources in photo archives.*
6. **"Google and the Future of Books,"** Robert Darnton, New York Review of Books, 56/2, February, 2009. *This essay considers if public and scholarly interests are served by court approval of Google screen delivery of books in and out of copyright. The essay does no suggest distinction between print and screen delivery or interdependence of the two formats.*
7. **"Google and the New Digital Future,"** Darnton, Robert, New York Review of Books. *Reviews and up-dates transactions of the Google settlement between authors and publishers. There is a short proposal for a digital public library.*
8. **"Hypertext Fiction Reading: Haptics and Immersion,"** Anne Mangen' Journal of Research in Reading, 31/4, 2008. *Explicitly identifies haptic and kinetic attributes of print that enable immersive, attentive reading.*
9. **"Library Storage Facilities and the Future of Print Collections in North America,"** Lizanne Payne, OCLC, 2007. *This report considers the future of library print collections. Reduction of legacy print collections is considered in context with a distributed print repository network. "Academic institutions are questioning whether their already low-use print collections will be made obsolete by more flexible and accessible digital book collections."*
10. **"Managing the collective collection,"** Jim Micalko and Constance Malpas, No.12, June 2009, OCLC. *This evaluation of projects hub repositories for print and associated reduction in aggregate academic duplication of print. Deacquisition processing would use interlibrary loan infrastructure.*
11. **"Mass Digitization: Implications for Preserving the Scholarly Record,"** Trudi Hahn, LRTS, 52/1, 2008. *This report admonishes the preservation community to stop being so reactive and to take a more strategic approach to preservation of digital access to books. There is a view that research library custodial care of books should not be relinquished to search utilities.*
12. **"Math of Publishing,"** Motoko Rich, New York Times, Business Day, Monday March 1, 2010. *Costing of publishers' services common to both screen and print delivery of books with projections of retail pricing for both formats.*
13. **"On the Cost of Keeping a Book,"** Paul Courant, CLIR, (forthcoming)

Handout 5.3.

14. **"Preservation in the Age of Large-Scale Digitization,"** Oya Reiger, CLIR, 2008. *"The goal of this white paper is to consider the potential links between large-scale digitization and long-term preservation of print and digital content, with emphasis on research library collections." Mechanisms of interdependence between print and digital book collections are discussed with reference to back-up, mastering and authentication roles and costs.*
15. **"Safeguarding Collections at the Dawn of the 21st Century: Describing Roles & Measuring Contemporary Preservation Activities in ARL Libraries,"** Lars Meyer, Association of Research Libraries, 2009. *On the changing balance of preservation needs and services associated with physical and digital content. Augmented by webinar; "Preservation: Evolving Roles and Responsibilities of Research Libraries," September, 15, 2009.*
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