

The Identical Books Project

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Introduction

The British Library was created as a new institution in 1973 from a number of separate library organisations in England. In 1998, the new building on Euston Road was opened, bringing many scattered functions together¹. Previously, conservation research for books had been carried out at The British Museum. Over the past decade, the BL has been increasing its activity in this area, starting in 2003 with the first conservation scientist to be employed by a British library.

A research strategy for addressing the future of care of the massive collections of books and other materials in the BL (ca. 625km of shelves and growing at a rate of 12km per year) and the other libraries in the UK was developed in 2004². Because conservation science is so inter-disciplinary and requires so many diverse skills, the BL aims to carry out research collaboratively. The expertise and equipment in appropriate university and other institutions are at the forefront of their areas of research. The BL will share and develop the necessary resources with those who know them best.

Mellon Conservation Research Project

The first major project is a collaboration between the six legal deposit libraries (LDL) of the UK and two of the national archives. The topics were identified in *Future Life of Collections*: natural ageing of materials, effects of the storage environment and non-destructive assessment methods. The research proposal has been generously funded by the Andrew Mellon Foundation, with a grant of \$698k.

Aims of the project

- To create and test a model of paper ageing *versus* storage environment.
- To investigate non-destructive methods of determining the state of books.
- To increase collaboration between conservation departments.
- To raise standards of conservation research.
- To increase UK conservation science capability.

1. <http://www.bl.uk/about/toppage.html>

2. *Future Life of Collections*, The British Library [2004].

Participants

- Collection partners: British Library, Cambridge University Library, National Archives of Scotland, National Library of Scotland, National Library of Wales, The National Archives, Oxford University Library Service, Trinity College (Dublin) Library.
 - Academic participants: Strathclyde University, Centre for Sustainable Heritage (University College London), Ljubljana University, Manchester University.
 - International advisory panel: Royal Library, Netherlands (Henk Porck), Library of Congress, State Academy of Graphic Arts Germany (Gerhardt Banik).
- The project is now divided in 6 strands.

Process and deliverables

1. Choosing Identical Books: types of books, choosing books by libraries.
2. Condition assessment: current state of the art.
3. Measurements: methodology, sampling of books.
4. Environmental modelling: construction of virtual model, methodology, comparison with condition data.
5. Volatile organic chemicals: current knowledge, methodology, scoping VOCs produced by books, comparison with condition data.
6. Capacity building: training conservators, building a community of research aware conservators, building external partnerships.

The application was developed during 2004-5 and started in October 2006 when a project manager was appointed. In parallel, considerable advances on assessing the condition of paper had been made, especially by workers in Ljubljana. The research plan built on these improvements, resulting in slight changes to the project.

1. Choosing Identical Books

400 books, identical in all six libraries, were to be chosen, covering the range of modern paper types, 40 books from each decade, 1900-1980 and 2000s, published in the UK. We chose books from 16 categories of object (from newspapers to maps) in order to sample a wide range of papers. This range enables us to study changes in both production and condition. These books will also provide a snapshot of the current condition of books so enabling



Picture 1: Most of the "400" Identical Books of the BL.

long-term evaluation of changes over future decades. The choosing process was not simple. The major libraries in the UK have pooled their electronic catalogues under an umbrella organisation, the Consortium of University and Research Libraries, Curl³. A search of this database for books published in London in 1905 revealed a worrying distribution (See figure 1, p. II.). Of the 33,000 corresponding books in the 6 LDL, only 26 titles were found in all 6. According to the database, 27,000 books are present in one only library. It is impossible for a normal user to extract this data via the web interface. We were kindly helped by staff who ran searches directly on the database. One frequently finds that databases can answer only those questions that the original designers of the information expected to be asked.

Also of interest are books which are not present in the database. No serials (newspapers, journals, parliamentary papers, maps) are included, nor (until much later publications) is any music. A couple of examples. For British Parliamentary Papers filling 600 metres of shelving and still growing, the BL has one catalogue record, dated 1833. The NLW has an active programme of converting its paper/microfiche records of non-Welsh books into electronic format – it had reached "D" when the database was interrogated. The electronic union catalogues do not provide a good overview of the nation's library holdings.

An alternative strategy was also used. Curators in the libraries produced lists for each of the book categories, 4 titles per decade, which were then circulated to the other libraries. This manual checking of the catalogues and shelves revealed a far healthier view of the holdings (See figure 2, p. II.). The large majority of the books are held by 5 or 6 of these libraries. Although months of work went into list creation and checking, this method produced only about half the number required. Extracting common books from the Curl database filled the remaining slots.

Because these books cannot be removed from the holding libraries, photographs of the title and sample pages of each book are compared with those of the primary

3. <http://www.curl.ac.uk/> (accessed 17/09/2007)

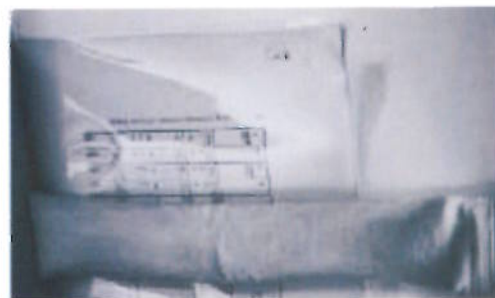
book as a further check on the "identicalness" of the books. A few in each library prove to be missing or not identical, because of different printings, etc. The number of books included in the project is now ca. 390.

2. Condition Assessment

Book condition: the UK's current method of assessment is the National Preservation Office, Preservation Assessment Survey (PAS)⁴ which has been widely implemented. PAS data on the Identical Books will relate the analytical results to current practice by librarians.

Paper condition: Kolar, Strlič and co-workers have shown that past measures such as surface pH and double fold tests are inadequate and that the best measures of paper condition is pH by extraction and cellulose molecular weight distribution (MW)⁵⁻⁶. These can now be measured using the same small sample, ca. 1mm in diameter. We follow these widely accepted methods to enable direct comparison with results from EU research projects, PaperTreat⁷ and SurveNIR⁸. The samples are also used to assess the fibre composition of the paper, providing another check on identicalness. The colour of the paper is measured as a further criterion of condition. Each library has agreed to have two samples taken from each book.

In order to reduce the inevitable errors in measurement, a number of protocols have been put in place. The conservators carrying out the measurements were trained together by Kolar and Strlič. They are retrained at the start of each library's period of measurement. The same equipment is used, an experimental kit transported around the libraries. The same two positions on the identical page in each Identical Book are ensured by locating the measurement and sampling points through a standard template. A set of sacrificial books is circulated with the kit and tested alongside the Identical Books, to check inter-laboratory consistency.



Picture 2: A Melinex template applied to the appropriate page to mark the sampling points.

4. <http://www.bl.uk/services/npa/paslib.html> (accessed 17/09/2007)

5. Strlič, M. et al., "A new electrode for micro-determination of paper pH", *Restaurator*, 26 (2005) 159-171

6. Strlič, M. and Kolar, J., "Size exclusion chromatography of cellulose in LiCl/N,N-dimethylacetamide", *J. Biochem. Biophys. Meth.*, 56 (2003) 265-279

7. <http://www.infosrvr.nuk.uni-lj.si/jana/papertreat/index.htm> (accessed 17/09/2007)

8. <http://www.science4heritage.org/surveNIR/> (accessed 17/09/2007)

3. Measurements

The conservators call for the books, check their identicalness, carry out the PAS assessment, photograph the relevant page, measure the colour at two points, then take the two samples. They carry out the first measurement, pH, on these two samples by extracting solubles using 5µl of water and measuring with a micro-pH electrode. The solution is then returned to the container and allowed to evaporate. The data are entered into a common database.

In each library, it takes two conservators about 3-4 weeks to process the 400 books. The kit is therefore circulating around libraries, from April to December 2007. When all the books have been examined, a sub-set of the samples will be chosen for fibre analysis and cellulose MW, with the assistance of epidemiological statisticians. This further analysis will be carried out by paper scientists at Ljubljana and Manchester Universities.

These measurements will provide as accurate an assessment of the condition of these books as can be achieved at this time. The data will then provide one side of the correlation needed to construct an environmental model for change of condition.

4. Environmental Model

It is well known that the environment affects the condition of paper. Although many accelerated ageing studies have studied this relationship, few have analyzed in detail the relationship between natural ageing conditions and the rate of deterioration. The advantage of accelerated ageing experiments is that all the experimental factors can be controlled and known: type of paper, its initial state, temperature, humidity, atmospheric pollution, time of exposure, size of samples, etc. In a natural ageing experiment looking backwards, none of these factors can be controlled, few can be known in detail, and there may be confounding factors which are unsuspected. The aim in this project is to gather environmental information (primarily relative humidity and temperature) and relate this to the condition of the books. One should use daily RH/T data that can be directly associated with each book in order to obtain the best possible correlation with its current condition.

Unfortunately, libraries have regular campaigns of building new storage buildings, while continually moving books between storage positions depending on their level of use and available space. Few libraries retain detailed records of these book movements. The project is still looking for collections which have not undergone movement and for which there is a good sequence of environmental data. Once that data is available, the correlation and construction of the environmental model can begin. This work will be carried out by the Centre for Sustainable Heritage (University College, London).

5. Volatile Organic Chemicals

The smell of old books and stores indicates something about their condition. The project will analyze the VOCs in stores of both the libraries and archives and in individual books⁹. These data will be correlated with the condition of the books as assessed by the PAS and analytical measurements. The aim is to assess the production of the VOCs, and predict their evolution using the inexpensive PAS methodology, then how the institutions can deal with these internal pollutants. The work will be carried out by the Department of Chemistry, Strathclyde University.

6. Capacity Building

The project builds upon existing cooperation between the heads of preservation of the LDLs and the national archives. Conservators from these institutions were brought together for the training sessions, leading to improvements in the project and independent networking. These participants all benefit by learning from the active experts in the field.

The project also builds upon the existing EU research networks, using the advances in techniques and is generating spin-off benefits. The use of an international advisory panel has also proved valuable, not just in improving the details of the project but also in strengthening relationships and prompting other joint initiatives. Paper conservation science has been neglected in the UK for many years. This project is helping the renewal of interest in this topic in university departments.

Conclusion

The field of paper and book conservation research is undergoing a long-delayed renaissance, reflecting the importance, and size, of the collections to be preserved.

This project began to work in October 2006 as a contribution to this effort. So far it has been successful with inevitable problems overcome. In March 2009 at the end of the project, we are planning a major conference to bring together its results as part of a survey of the advances that are being made around the world.

9. e.g. Lattuati-Derieux, A. et al., "Identification of volatile organic compounds emitted by a naturally aged book using solid-phase microextraction/gas chromatography/mass spectroscopy", *J. Chrom. A* 1026 (2004) 9-18.

British Library : Identical Book Project

La *British Library* a lancé en 2006 un nouveau projet en collaboration avec les six bibliothèques britanniques de dépôt légal et deux des archives nationales, intitulé *Identical Book Project*. Il porte sur les thèmes suivants :

- le vieillissement du papier ;
- les effets des conditions de stockage ;
- les méthodes non destructives permettant de mesurer les dommages causés au papier.

Le projet comporte six étapes :

- sélectionner les livres identiques conservés dans chacune des bibliothèques partenaires du projet ;
- évaluer la condition actuelle de ces livres ;
- procéder à des mesures et des échantillonnages ;
- construire un modèle en mettant en relation les informations relatives à leurs conditions de stockage (la température et l'humidité relative, principalement) et la détérioration du papier ;
- mesurer les composés organiques volatils produits par ces livres ;
- former les conservateurs et promouvoir des partenariats.

Le projet doit prendre fin en 2009.

Biblioteca Británica: "el proyecto de los libros idénticos"

La Biblioteca Británica inició en 2006 un proyecto en colaboración con las seis bibliotecas del depósito legal y dos de los archivos nacionales, que se llama "el proyecto de los libros idénticos".

Los temas son:

- el envejecimiento del papel;
- los efectos del ambiente de almacenamiento;
- los métodos no destructivos para evaluar el daño a los materiales.

El proyecto se compone de seis etapas:

- escoger los libros idénticos conservados para cada una de las bibliotecas coparticipes;
- evaluar la condición actual de estos libros;
- hacer medidas y muestrarios;
- construir un modelo virtual al poner en relación las condiciones de almacenamiento con la deterioración del papel;
- evaluar los compuestos volátiles orgánicos producidos por los libros;
- formar a los conservadores y promover la colaboración.

El proyecto debe acabarse en 2009.