

Identical books: predicting their future from their current condition

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## Introduction

The purpose of the Identical Books research strand of the Mellon research project was to investigate the differences between the microclimate and pollution of library environments, to establish whether there are any differences between the books in the UK legal deposit libraries, and to carry out a lifetime prediction study. This abstract focuses on the third objective.

## Characterisation of identical book collections at BL and NLW

Using micro-samples extracted from paper with a hollow needle of 0.8 mm diameter, we were able to determine the following properties: pH, molar mass and fibre furnish, both in the centres and margins of identical pages in identical books of the two collections, so that an evaluation of differences was possible. Samples, in which pH has been determined, were dried after analyses and then forwarded for determination of molecular weight using size exclusion chromatography of carbanilated cellulose<sup>1</sup>.

## Lifetime prediction study

Results of the size exclusion chromatography of carbanilated cellulose and the results of pH were used to predict the remaining useful lifetime of the selected identical books, using the methodology developed within a recently completed Papertreat project (<http://www.infosrvr.nuk.uni-lj.si/jana/papertreat/index.htm>). The following was used to calculate the predicted useful lifetime of paper in identical books:

- average molar mass of carbanilated cellulose correlates with mechanical strength of paper and degree of polymerisation (DP) of cellulose<sup>1,2</sup>,
- rates of degradation of paper at certain pH at ambient conditions (about 21 °C, 50% RH) were used to calculate the remaining useful lifetime of paper – i.e. the time in which the paper within the book will become unusable, if from now on stored at identical ambient conditions
- DP 200 was used as the threshold below which paper was considered unusable, i.e. too fragile to be delivered to general readers.

Using this approach, rate of loss of collection of 313 identical books was predicted (Fig.1).

## References:

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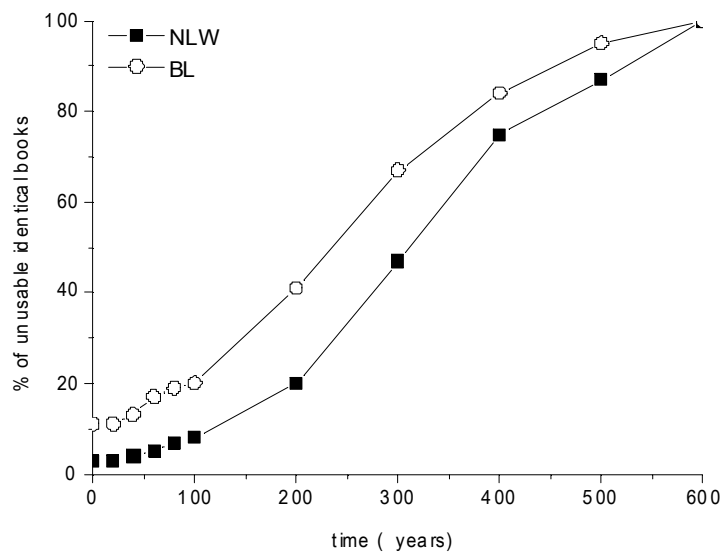


Fig. 1: Predicted rate of loss of collection of identical books, when stored at similar ambient conditions.

#### Conclusions

The study of two identical book collections and repositories from the National Library of Wales and British Library showed that:

- At present, the papers close to margins in identical books from BL are significantly more degraded (10% unusable) than the papers in identical books at NLW (3% unusable). This corresponds well with colour measurements, where it was demonstrated that the book margins in NLW are in general less yellow than in the BL.
- Using the described approach, it can be predicted that the number of unusable identical books in both libraries will double in approximately 100 years.