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ABSTRACT

Previous studies on use of library materials based on borrowing behavior failed to address the issue of how the measurement of library book use might be expanded to a broader definition of use, specifically to include browsing behavior. The development of a non-obtrusive and accurate measurement for browsing behavior has remained a challenge. Research involved an adaptation of a counter-espionage technique, called a "tell-tale": small unobtrusive slips of paper were placed in selected library volumes. Movement or loss of the tell-tale indicated browsing within the volume. Sampling technique for the 133 volumes chosen is outlined. Browsing data from tell-tale displacement is provided in tables for both 6 week and 20 month time lapses. Results showed the "browsing ratio" (number of volumes indicating browsing divided by total volumes accounted for) appeared to be several times greater (six to seven times) than the proportion checked out. While the ratio increased over time, there was no observed steady rate of browsing as a function of time. Discussion of the results includes the lack of evidence of "repeat browsing," failure to locate items due to misshelving, and recommendations for increased accuracy of results. However, this research demonstrated that evidence of browsing could be objectively and unambiguously determined and measured. (MAS)

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University Library Browsing: A Study Illustrating a Methodology

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INTRODUCTION

With what frequency do students or other patrons at a University library actually use the volumes found in the general book collection? Two previous studies (Ridley & Jones, 1992) illustrated a methodology for studying use in the sense of borrowing behavior. The two methods, designed for both pre- and post-automation of book check-out procedures and records, converged on similar results for a particular class of volumes, viz., those representing works designated as prominent novels of the West. However, those studies left unaddressed several issues one of which is addressed by this article. For example, one issue (being dealt with elsewhere) was how the borrowing behavior for the specialized class of volumes being studied compared with the general borrowing behavior with regard to other classes of volumes or the University book collection as a whole. Another issue, which is the concern of this article, is how the measurement of library book use might be expanded to a broader definition of use, specifically to include browsing behavior. One of the obvious reasons for having open public access to a University's book collection is to encourage browsing. There is no substitute, electronic or otherwise, for actual inspection of volumes found on the library shelves to determine whether they might be worthwhile to borrow. However, the development of a non-obtrusive and accurate measurement for browsing behavior has remained a challenge for which the current study was proposed and carried out.

PROPOSED METHODOLOGY

Preliminary Issues

At the outset it is necessary to define the target behavior designated above by the word "browsing." First, the definition must be operationalized so that it might be measured. No matter how clearly the term appears to be understood, unless the behavior (or its effects or traces) can be measured in a valid and reliable manner, the problem has not been solved. Relatedly, the operations used to define the phenomenon should not in turn influence the phenomenon; i.e., the measurement preferably should be non-reactive. This last consideration would rule out direct observation of patrons through time-sampling.

Second, the definition (and the measurement flowing from it) should be tied to what happens to actual volumes. Only thus can we find a basis of comparison with the behavior of borrowing, and then compare a "borrowing rate" with a "browsing rate" for specific classes of volumes or for the collection as a whole. For example, the data should answer the question: How often are books in the collection the subject of browsing (i.e., handled and inspected in

a way that strongly suggests the actions taken preliminary to a decision to borrow)? Clearly, mere handling (moving books from one place to another) does not qualify as browsing. A good answer to this question would be directly comparable to a good response to the question, What is the average borrowing rate for the collection as a whole? In turn, the two answers could be directly compared.

The second issue, however, raises the question of what exactly is the relationship between borrowing and browsing. This relationship needs to be clearly understood in order to compare and quantify the two kinds of behavior. This point is best understood with an example. Let us suppose that at any given time, approximately 5 percent of the total library collection is out on loan to library patrons. Of course, in a few cases a book may be out for repairs, on reserve, placed on display, or for some other special reason removed from the shelves. However, since borrowing is by far the biggest factor in removal from the shelves, we will assume that if borrowing accounts for 5 percent of the collection, very nearly 95 percent of the circulating collection would remain on the shelves and be available for possible browsing. The problem is that over time, an average of 5 percent borrowed would tend to subtract the most likely candidates for borrowing from the shelves. The 95 percent remaining would tend, on average, to be among the least borrowed items or at any rate not include the most likely to be borrowed. However, to be able to compare browsing and borrowing rates fairly, both rates should have reference to the entire collection. Otherwise, a biased estimate of browsing would result because it would be based on the total collection minus the most popular books for borrowing.

A fourth issue concerns sampling. As in most research studies, it would be impractical to observe all cases (i.e., volumes) for evidence that browsing (i.e., inspection) had occurred. Therefore, a sample should be drawn that might be regarded for sound reasons as representative of the collection as whole. Moreover, whatever results are obtained and translated into an index called a "browsing rate" should be amenable to standard statistical treatment the end result of which would be a decision rule. The decision rule would permit a conclusion that the measured rate was within a determined distance (in the units chosen for measurement) of the "true" browsing rate. While this outcome is desirable eventually, the objective of this study with respect to this issue was more modest: to specify what might be changed in the procedures to arrive at this outcome in the future.

Proposed Measure of Browsing: Counter-espionage Approach

The proposed method is an innovative adaptation of a counter-espionage technique, encountered by the first author in the context of spy novels (see, for example, the novel Triple by Kenneth Follett). This technique is called the "tell-tale." A standard

(second) dictionary definition of this word is, "a device for indicating or recording something." In the context of the spy, it is a method of survival designed to be unobtrusive yet indicate infallibly to the spy that he himself is being spied upon. For example, it could be a tiny thread that would be displaced by an intruder into the spy's hotel room.

The adaptation of this idea to browsing is as follows. Small unobtrusive slips of paper would be placed carefully at the top of the first page in selected library volumes, and the volumes then carefully closed to hold the papers in position. The tell-tale being thus put in position, if the book were opened to the first page, it would necessarily fall out or slip. The paper would remain in the designated position (known only the researchers) if the book were merely moved from one place to another. If the paper were to fall out, it would be extremely unlikely that the browser would replace it in the pre-selected position. Thus, the effects of browsing would be irreversibly indicated. Examination from time to time would permit one to state that the tell-tale had changed position or been removed. By comparing the results of this examination with the elapsed time and by replacing the tell-tales over time, an average rate of browsing per volume could be calculated.

Implementation of the Method and Response to Issues 1-3

With regard to the first two preliminary issues raised above, the proposed method is both operational and tied to what happens to actual volumes. It is also a non-reactive method. The method also allows one to discriminate between merely moving books from one location to another and actually opening them for inspection. Thus, the actions of librarians or student assistants in rearranging the books on the shelves would rarely displace the tell-tales. Furthermore, browsers would be unlikely to cover their tracks by replacing the tell-tale to its former location. Of course, it is always possible that a person will browse in a book and not open to the first page but rather toward the middle of the book. However, actual experimentation and observation leads us to believe that this behavior also would be quite rare. Browsers typically scan for orienting information such as is found in the preface or table of contents at the front end of a volume.

The third issue appears at first to be a bit more difficult. How do we assure that the measure of browsing applies broadly to the entire collection? Since we cannot observe the tell-tale if the book has been taken out on loan, how do we observe the evidence of preliminary browsing? A reasonable answer is to conceptualize browsing as the typical preliminary behavior that occurs before a volume has been checked out. Therefore, if the volume has been checked out, we also count the book as an instance of browsing. The logical relationship between the two would be that not all browsing leads to borrowing, but borrowing (for practical purposes)

presupposes and follows browsing. We assume that the typical behavior is to examine the book at least enough to know whether it is worth the effort to carry it away.

Sample Selection -- Issue Number 4

The fourth issue, sampling, was resolved by developing a procedure for selecting approximately 133 volumes from the circulating collection of volumes. The procedure followed five steps:

1. The entire collection of volumes that circulate was conveniently divided by the physical configuration of shelves, so that volumes could be selected by shelf. This physical division was convenient and greatly facilitated sample selection. The shelves selected were similar in every respect except their dispersion throughout the entire collection. While shelves varied in the number of volumes the variation was not extreme.

2. The call numbers associated with the first and last volumes on each shelf were recorded.

3. The online library system was used to call up the first volume in the series associated with each shelf. Scrolling through to the last item on the shelf, the total number of volumes officially associated with that shelf was recorded.

4. By random number generation, one volume was selected for each shelf counting from the first item on the shelf. The items so numbered were then identified in the online system.

5. The call numbers of each selected volume were recorded if they corresponded with a volume that could be circulated. If this was not the case, the next volume in sequence was selected until the desired selection was made for each shelf.

The sample having been selected as described the tell-tales were placed in each volume in the manner discussed earlier. This initial step was carried out in a quiet, unobtrusive manner over several days.

RESULTS

A total of 133 volumes was selected as described above. Thirteen volumes could not be located; therefore the final sample selected was made up of 120 volumes.

The tell-tales were checked the first time after six weeks' time had elapsed. The period of time selected was in the midst of a semester and thus a period of peak use. The following table summarizes the status of the volumes and tell-tales at this time:

TABLE 1: BROWSING DATA AFTER SIX WEEKS

A.	VOLUMES WITH TELL-TALES MOVED:	10
B.	VOLUMES MISSING FROM SHELF POSITION:	12
C.	VOLUMES (out of B) CHECKED OUT:	2
D.	VOLUMES WITH TELL-TALES IN PLACE	98
E.	TOTAL VOLUMES (A + B + D):	120

As operationally defined earlier, the number of volumes showing evidence of browsing equals A + C, or 12 volumes. A browsing "ratio" could be defined as the numbers of volumes indicating browsing (i.e., 12) divided by the total number which could be located or accounted for, which is E - (B - C). The latter number is the total sample decreased by the unaccounted for missing volumes. The browsing ratio, so calculated, was 12 ÷ 110 or .11.

After the first check the tell-tales were replaced as before in the volumes which could be located (n = 117).

Second Check

The tell-tales were checked a second time after a lapse of approximately 20 months. Again the checking was carried out during a period of peak library activity. The results were determined in the same manner as before. These data are summarized below.

TABLE 2: BROWSING BEHAVIOR AFTER 20 MONTHS

A.	VOLUMES WITH TELL-TALES MOVED:	17
B.	VOLUMES MISSING FROM SHELF POSITION:	38
C.	VOLUMES (out of B) CHECKED OUT:	3
D.	VOLUMES WITH TELL-TALES IN PLACE:	62
E.	TOTAL VOLUMES (A + B + D):	117*

*[The discrepancy between this number and the previous sample number is due to the non-replacement of tell-tales in volumes which could not be located for that purpose.]

"Browsing" was indicated by A + C, or 20 volumes. As before, a "browsing ratio" was calculated by dividing the latter numbers by E - (B - C) or 82 volumes. The ratio thus calculated was 20 ÷ 82 or approximately .23.

DISCUSSION

The "browsing ratio" appears to be several times greater (i.e. 6 or 7) in these trials than the proportion checked out. While the ratio increased over time, there was no observed steady rate of browsing as a function of time. The result at first appears counter-intuitive, but that is due to the fact that the focus of observation is volumes, not students. Whereas students may be consistent in their browsing over time (i.e. when activity is averaged out over periods of heavy and slack library use), the data gathered for the study would not tend to reveal a steady average rate over time.

The following analysis supports this conclusion in two ways. First, repeated browsing would tend to occur on the volumes which were in greatest demand. However this "repeat browsing" would not result in further evidence of browsing since once the tell-tale had been displaced it would be impossible to tell how many times browsing behavior had occurred since the last check. Second, some of the volumes missing from their positions on the shelves and unaccounted for might have been mis-shelved after browsing had taken place; these volumes would have shown evidence of browsing had they been located. Again, as contrasted with the generality of books in the library, those mis-shelved would have included some of the most likely to be selected by library patrons--i.e. those they had browsed through to narrow their selections. Over time more volumes in the sample would tend to get misplaced back onto the shelves, thus removing some evidence of browsing and reducing the probability of future browsing. Both of these likely factors would help explain the observed tapering off in the <u>increase</u> of the

browsing ratio over time. These considerations suggest that more frequent and uniform checking periods should be defined to result in more precise measurement of a "browsing rate." As the period of time between checking and rechecking was reduced, the effects of the above two factors would be diminished, and the "browsing ratio" could be taken as the estimate of the "browsing rate."

However, the fourth issue raised earlier--how to estimate the "true" browsing rate from a sample--should be revisited as stated. To estimate a "true" browsing rate would first require more frequent checking periods as mentioned above; second, repeated trials with new samples of volumes would allow the deduction of a standard error of measurement, using a formula which is available in standard textbooks of statistics or tests and measurements. The formula requires, first, the observed standard deviation of the browsing ratios (i.e. browsing rates found in closely spaced trials), and second, the reliability of measurement. The latter could be estimated by correlating two different browsing rates found for the same samples (at different times) over a set of samples. (The resulting statistic would need to be corrected for the size of the set--an application of the Spearman-Brown Formula.) Having these two statistics (sample standard deviation and reliability estimate) would yield the standard error of measurement. Assuming that errors of measurement would be normally distributed, it would then be a straightforward matter to set up a confidence interval, allowing one to state the statistical level of confidence of the estimate being within a specified "distance"--in browsing rate terms--of the "true" rate.

SUMMARY AND CONCLUSIONS

The present study has explored the operational measurement of "browsing behavior" through applying a non-reactive method. The behavior was operationally defined in terms of the movement of "tell-tales." This definition is the application of a counter-espionage approach to the problem.

The results from two separate periods of checking "tell-tales" were consistent in some ways and not in others. A consistent difference between the "browsing ratio" and the "borrowing rate" was found indicating that volumes showed evidence of browsing at a rate approximately 6-7 times that of check-outs. The results were also consistent in that evidence of browsing could be objectively and unambiguously determined and measured. However, results did not yield a consistent trend over time that could be called "browsing rate." Some reasons for the failure to find a uniform rate were discussed.

The results of this preliminary study should be validated through conducting follow-ups such as: (a) selecting new samples and re-running the study; and (b) testing for consistency of

results with other more reactive data such as that of a time-sampled observational study. The application of these methods has the potential of strengthening confidence in the method and/or revealing some of its limitations. Furthermore, the first method can yield statistical information regarding the relationship between the obtained results and a hypothetical "true" browsing rate.

It can be concluded that the study was a reasonable first attempt to study browsing which satisfied most of the preliminary issues raised at the beginning of the study.