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ABSTRACT
                The identifiable age grouping of the optimum
circulation interval for journal usage is five years. Heaviest
journal usage occurs during the first five years after its
publication date; and beginning with the sixth year, use becomes so
infrequent that requirements for return of the journal within two
days creates unnecessary hardship on the user. Journal usage is
inversely proportional to the age of the journal. (MF)

AN

INVESTIGATION INTO THE

SIGNIFICANCE OF AGE AS A FACTOR IN

SELECTING AN OPTIMUM CIRCULATION PERIOD(S)

FOR SERIALS

By

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2. Cumulative Percent of Daily Discharges Published Before
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3. Plot of Regression of the Number of Checkouts On The
   Age of the Journal Using $y = \alpha X^{\beta}$ As Model.

A. Purpose of This Study

To determine if there exists an identifiable age grouping of the circulating serials and to test the following hypotheses:

1. That the older journals tend to be used less than the more recent ones and can, therefore, legitimately be allowed to circulate for a longer period of time without imposing any service penalty on other users who might be deprived of an important resource while the serial is out of the building.

2. That a logical breaking point in serial use occurs after a journal is 5 years old. Or, stated another way, greatest use of a journal is made during the first five years of its life; and, beginning with the sixth year, use (defined here as a request to take the volume or issue outside the library) becomes so infrequent that to require its return within two days works an unnecessary hardship on the library's public.

B. Goal of This Study

To establish an optimum circulation interval (of those now used by the Loan Desk) for serials as a function of the age of the journal.

C. Introduction And Dimensions of the Problem.

In order to maintain its viability, any service oriented organization must continuously review its operating assumptions in the light of current realities and the needs of its

clients. Without this continuing self-evaluation
administrative rigidity quickly sets in and the organ-
ization loses both its direction and sense of purpose.
The ability to respond immediately to changes in the
requirements or use patterns of its clients is essential
to the health of any public service organization.

The investigation reported here is a use study with
use defined in a very specific way and having for its sole
predictor variable the age of the publication. Use, as
defined in this report, has nothing to do with the study of
patron reactions; nor are we concerned with whether the user
looks at or even opens the journal which he chooses to take
from the library. Use is defined here exclusively as the
act of legally removing a journal (either single issue or
bound volume) from the library and returning it.

This investigation studied only the optimum circulation
interval for a journal. No attempt was made to review
the broader problems of user demand/satisfaction, purchase
vs. borrowing, or the storage of lesser used materials. ·
While these problems are related to the one under investigation,
they were judged to be outside the province of this study
and will not be considered here. This survey focuses on the .
circulation interval as a function of the serial's age and
on the determination of its (the interval) optimum size in
order to maximize user satisfaction.

The basic unit for serial sampling in this investiga-
tion was the physical piece. This can be either a single
volume or several volumes bound together, and in some cases
it may even be a single loose issue. No attempt was made
to distinguish between a bound or unbound serial. Nor was
any attempt made to isolate and study material by subject
fields, because of the physical impossibility of expecting
a clerk or student assistant working at the Loan Desk to
set different circulation periods for different subject
fields.

D.   Methodology

This study examined the assumption that all journals,
independent of their age, must circulate for 2 days, and
sought to determine if two or more circulation periods
(from those presently in use - 2 hours, 12 hours, 2 days,
3 days, 2 weeks, the quarter) would better meet the needs .
of our users. The investigation will seek to do this by
ascertaining if there exists a time in the life of a serial
during which it receives greatest use. If such a heavy
use period could be identified, it would be possible to
place a limited cir lation interval on the journal during
this period, and then extend the circulation interval once
this period has expired. Suggested circulation intervals
are 2 days and 2 weeks both of which are presently under-
stood and in use by the Loan Desk staff.

At the close of each circulation day all McBee cards
for discharged serials (identified by a due date stamped
on card in purple ink) were tabulated by R/D in such a
way that the number of returning pieces were tallied by
the date on their cover. Twenty-five age categories were
used for the period from 1970-1947 including one category
for those serials bearing an earlier cover date. To this,
but not considered one of the twenty-five, was added a
category for cards which could not be used and were, there-
fore, discarded. Only 1.8% of the sample drawn was dis-
carded. These cards were withdrawn because they contained
no date. Bound volumes which contained multiple dates were
assigned the most recent date on the serial piece. All
cards were tallied by calendar year so as to indicate the
total number of pieces which had been returned to the library
bearing a given age.

D.   1.   Literature Review

Very little material which addressed itself directly
to this problem was found in the literature. There are
numerous studies of library use (Jain 1 reports over 700
by 1967) examining everything from citation counts to ref-
erence questions, but no study was located which pertained
solely to the problem being examined here.

One of the better usage studies examined was that by
Fussler and Simon (3). They studied the problems of select-
ing material for secondary storage and user access based

upon a variety of parameters (language, age of publication, elapsed time since last use, and elapsed time since acquisition) affecting the material sought. Their conclusion that "...the rate of use of titles continues to decrease indefinitely with the age of the title..." (p.145) supports the conclusions of this study. This position is further buttressed by the work of Jain (1) who found that "...age is a significant variable in predicting the rates of usage..." (Preface) of the library's book stock.

Most of the studies examined in the literature reported on library use and user satisfaction as factors related to the size of the collection, or the necessity for purchase of duplicate copies, or how the scientist acquires his information, or the selection of material to be placed in secondary storage, and gave little consideration to the problem under investigation here. However, of the studies examined there were five, in addition to the Fussler and Simon, which touched on the problem studied here and were, therefore, judged to be worthy of mention. These include the work of Cole (2), Jain (1), Vickery (4), Shaw (5) and Cole (6).

Nevertheless, each of these investigators (except Jain, Fussler and Simon) examined a very limited population of scientific and engineering journals and were, therefore, judged to give only supporting weight rather than conclusive evidence to the present investigation.

Cole (2) studied usage as a function of the age of the scientific serial in determining future demand. Vickery (4) examined the literature of medicine, agriculture and technology and came to the conclusion that 55% of the use of the literature in these disciplines occurs in the first 10 years (p.266) of its life. His findings are further supported by the work of Shaw (5) and Cole (6) who report that 95% and 96%, respectively, of the literature use they studied involved materials less than 10 years old. Shaw also reports that 83% of the literature used was less than one year old. Each of these studies supported our hypothesis that use and age are inversely proportional with the greatest use occuring somewhere within the first 10 years of a journals life. No studies were found in the literature contradicting this point of view.

D.   2.   Assumptions

Before any in-depth study could be made of age as a factor of use it was necessary to make some assumptions about the investigation and about the population to be surveyed. These assumptions are as follows:

1. That the use of the library's serial holdings made during the period of the study is a reliable index of all use made of serials outside the building.

2. That the age distribution of those journals which were charged out of the library is statistically comparable to the age distribution of those which were checked in.

3. That use of need (however these may be defined)
can be discussed as a function of the age of the journal.

4. That checking a journal out of the library is
indicative of a felt need (whether real or imaginary)
on the part of the patron.

5. That the activity at the Loan Desk during the
study period is typical of the entire school year.

6. Whatever circulation period(s) is (are) adapted
or charges made, they must be easily identified and the
rule for their use simple to understand and easy to apply.
Further, it would be in the best interests of both library
and patron if one of the circulation periods now in use
could also serve for serials.

D. 3. Parameters of the Study

1. The study ran and data were collected for each
day the library was open from May 11 - August 31 for a
total of 108 days.

2. 24 age categories were used ranging from 1970
through 1947. To this was added one column for all serials
published earlier than 1947 and one column for data which
could not be used.

3. There were 14,786 samples taken. Of this number
270 (1.9%) were discarded as not being useable, and 715
(4.8%) of those drawn contained dates earlier than 1947.

4. The range in circulation varied from 3496 (those

journals with a cover date of 1970) to 46 (cover date
of 1947).

5. The arithmetic mean of the daily circulation
(not counting the discarded samples) was 14516 ÷ 25 or
581. It was interesting to note that this figure occurs
quite soon in the circulation history of the journals
studied (between the years 1965 and 1964) and lends ad-
ditional support to our hypothesis that heaviest use
occurs early in the life of a journal.

E. Conclusions

1. Without exception the findings of other investi-
gators (1,2,3,4,5,6) in this area bore out the conclusions
of this study. There exists a positive correlation be-
tween the age of the material and the use (as defined
herein) being made of that material. The present study
bears out and supports these earlier findings. See
Table 2.

2. It was first thought that the data gathered here
would fit the equation

(Eq.1)

$$D = \frac{1}{A}$$

where D = Demand as expressed by the number of journals
          (pieces) removed from the library bearing
      A = the age (in years) of these pieces.

However, a more careful plot of the curve seen in
Fig.1 with some help from the Statistical Lab produced

the following equation, using regression analysis, as a
better fit for the data plotted in Table 1. From this
equation it is now possible to generalize the relation-
ship which exists between date of a journal and the
demand or use likely to be made of that journal. Notice,
however, that this prediction is for journal titles in
the aggregate and bears no relationship to the subject
matter. The conclusions from this study in so far as they
are supported by the data and borne out by similar research
are as follows:

1. The use made of a journal is inversely proportional
to the age of the journal and can be expressed as a function
of the Equation 2.

(Eq.2) $$y = \alpha X^{\beta}$$

Where X = age in years of the journal beginning with
           the most recent, 1970 in this case, = 1.
           Zero is undefined.

     Y = number of predicted journals to be checked
         out bearing a given date.

     α = Constant 8973

     β = -1.491

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2. From this it is possible to infer that the need to check-out a journal from the library (referred to here as its use) declines as that journal's age increases. It is also significant to note that the greatest drop (See Table 1) took place between the first and second years, the next greatest between the second and third year etc. This is more easy to visualize if one studies the histogram in Fig. 1 and the curve plotted in Fig. 3 from which the equation was derived.

3. Note that the use began to level out between the years 1968 and 1963 indicating that the boundary for an optimum circulation interval should lie somewhere between these ages (3 and 8). See Fig. 3.

F. Recommendations

1. That the Circulation Librarian be asked to study this report and submit, in the light of the enclosed data and her own requirements, recommendations for or against the following points:

a. The CSU Libraries should adapt as policy the concept that all journals over five years old will be treated as monographs in so far as their circulation interval and renewal are concerned.
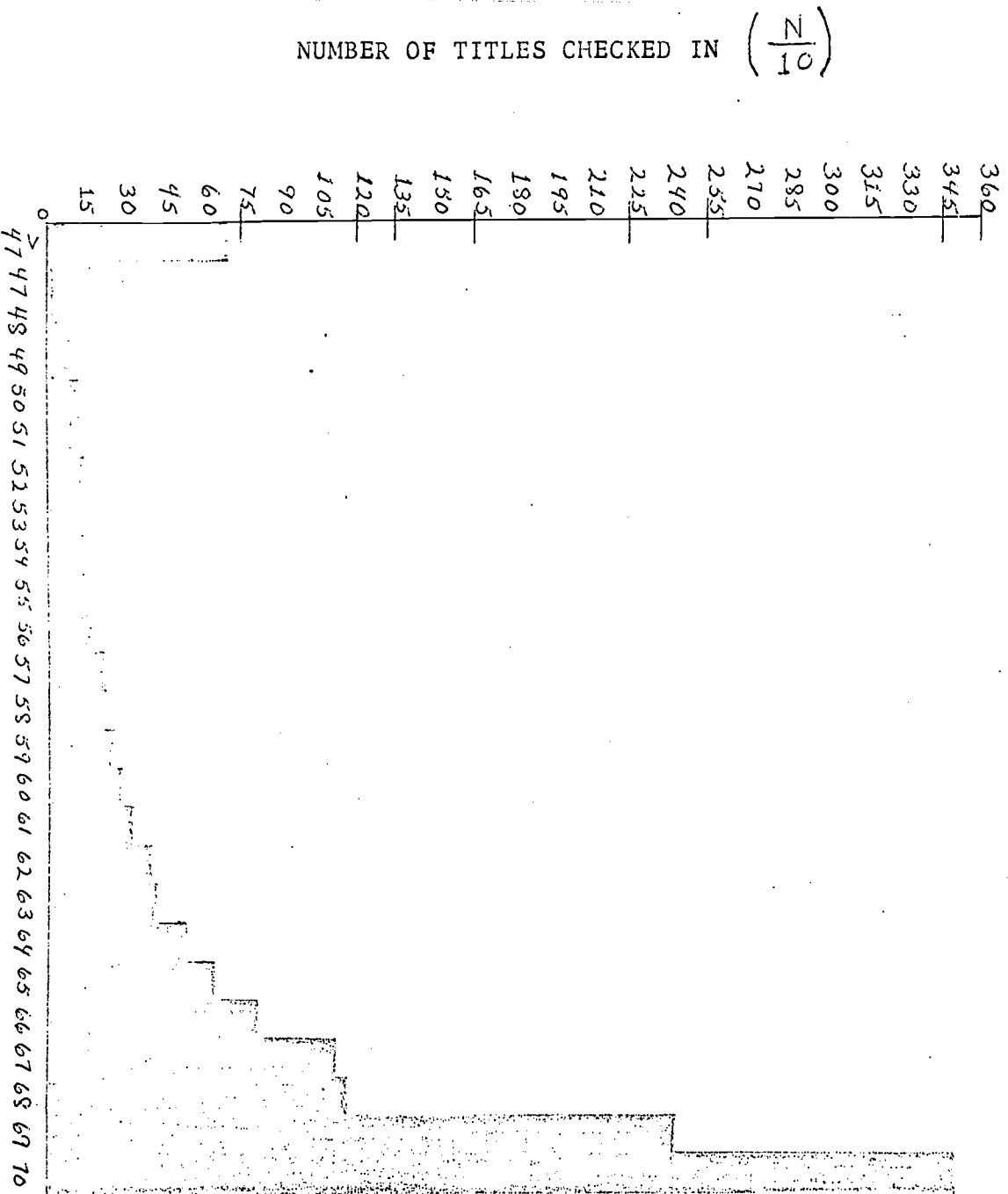
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NUMBER OF TITLES CHECKED IN $\left(\dfrac{N}{10}\right)$

Fig. 1

HISTOGRAM SHOWING TITLES CHECKED-IN WHICH BORE A GIVEN DATE

DATES

Percentage Before a Given Date

Fig. 2

CUMULATIVE PERCENT OF DAILY DISCHARGES
PUBLISHED BEFORE (INCLUSIVE) A GIVEN DATE

100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
9
8
7
6
5
4
3
2
1

$y = 1$

$y = 5$

Earlier

47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70

DATE

17

NUMBER OF CHECKOUTS

4000

3000

2000

1000

500
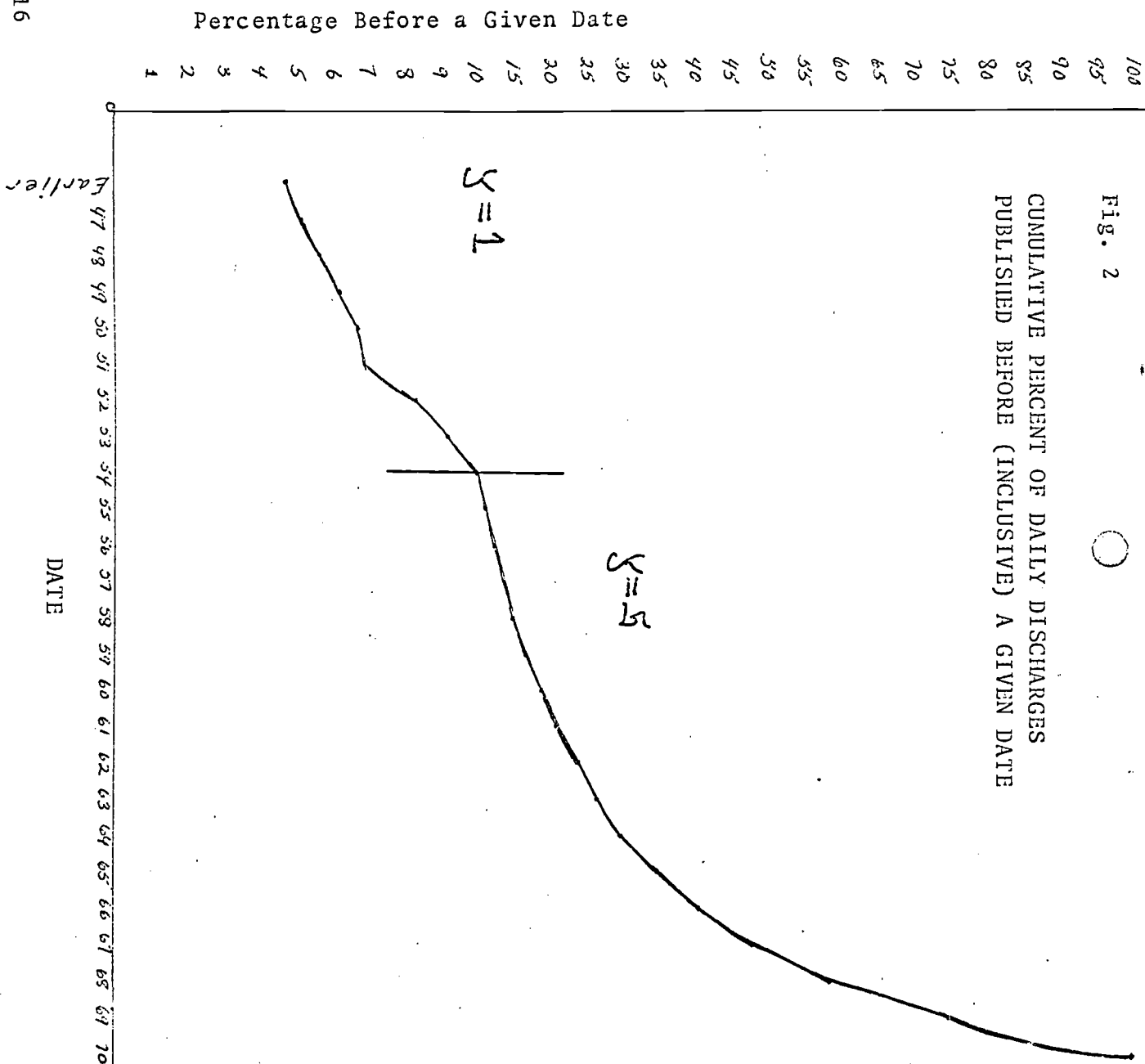
Fig. 3

PLOT OF REGRESSION SHOWING THE NUMBER OF CHECKOUTS

ON AGE OF THE JOURNAL USING $Y = ax^b$ AS MODEL

$Y = 8972.581 \quad X - 1.491$ Correlation Coefficient = -.985 (left out 1970)

$Y = 6329.905 \quad X - 1.356$ Correlation Coefficient = -.979

AGE
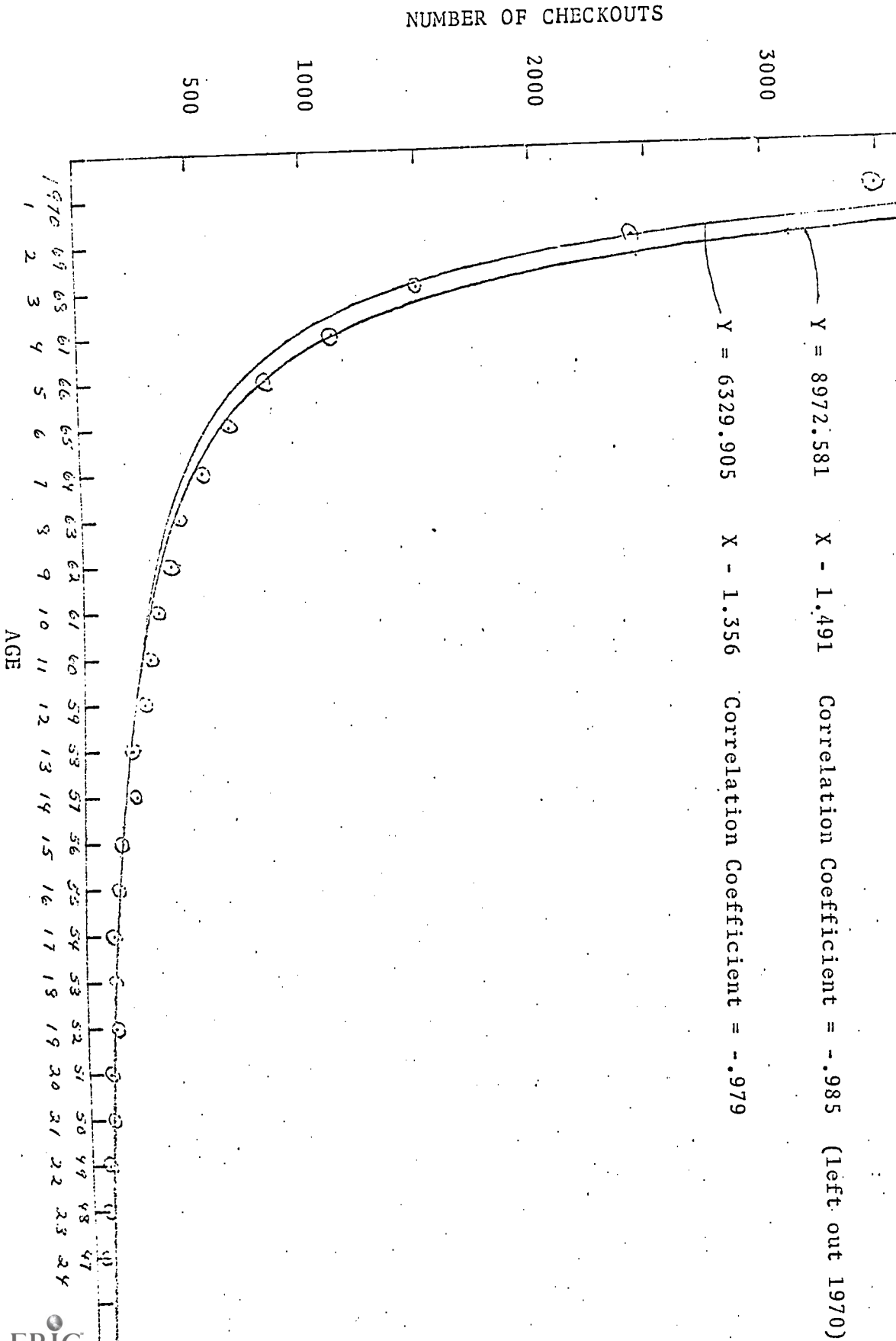
*Base = 14,786   †Base = 14,516

	DATE ON COVER	NUMBER(ΣY) OF PIECES Discharged having a Given Date	% of The Total*	Size of Interval $(X_1 - X_2)$	Cumulative % showing number of Issues Published By (Inclusive) Date†	Average Circulation of Pieces Discharged (ΣY) is $N_{\Sigma Y} / N_D$ where $N_D = 108$	
1.	1970	3496	23.6	1060	100	32.4	1.
2.	69	2436	16.5	939	75	22.5	2.
3.	68	1497	10.1	375	59	13.8	3.
4.	67	1122	7.6	298	48	10.3	4.
5.	66	824	5.6	160	41	7.6	5.
6.	65	664	4.5	128	35	6.1	6.
7.	64	536	3.6	106	30	4.9	7.
8.	63	430	2.9	39	27	3.9	8.
9.	62	391	2.6	58	24	3.6	9.
10.	61	333	2.2	40	21	3.0	10.
11.	60	293	1.9	29	19	2.7	11.
12.	59	264	1.8	53	17	2.4	12.
13.	58	211	1.4	-19	15	1.9	13.
14.	57	230	1.6	75	13	2.1	14.
15.	56	165	1.1	17	12	1.5	15.
16.	55	148	1.	26	11	1.3	16.
17.	54	122	.83	-3	10	1.12	17.
18.	53	125	.85	0	9.3	1.1	18.
19.	52	125	.85	27	8.4	1.1	19
20.	51	98	.66	-4	6.9	.90	20
21.	50	102	.69	23	6.9	.94	21
22.	49	79	.53	15	6.2	.73	22
23.	48	64	.43	18	5.6	.59	23
24.	47	46	.31		5.2	.42	24
25.	Earlier	715	4.8		4.8	6.6	25
	Dis-ded	270	1.8			2.5	

TABLE 2.

AGE GROUPING OF SERIALS CITED IN SURVEY AND IN SUBJECT BIBLIOGRAPHIES.

Percentage of Material Checked Out or Used In This Age Category	AGE OF SERIALS REQUESTED BEGINNING WITH MOST RECENT			
	0-5	6-10	11-20	21 years & older
Burns	64%	16%	12%	7%
Vickery (4)	55%		25%	20%
Reported In a Study of Subject Bibliographies (4)	40%		25%	35%