

# A note on inattention: Evidence from library services in São Paulo

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## Abstract • Resumo

This note provides evidence on inattention in an information commons. Employing a large dataset compiling daily transactions in libraries, we compare a specific compliance behavior of library users over weekdays. If inattention affects rule compliance, then one would plausibly expect greater return delays in periods of potentially higher inattention, such as the day before weekends, holidays, and exam weeks. We found robust evidence of a day of the week effect: inattention, as approximately measured by delays in returning checked out books, is consistently higher on Fridays. Meanwhile, there is no evidence of such an inattentive behavior in dates near holidays, or exam weeks.

## 1. Introduction

Given the increasing amount of information that most people face today, as well as their cognitive limitations, it is not feasible to simultaneously focus their attention on all events they face (Simon, 1955). As a result, inattentive behavior may arise in distinct situations, even when people receive constant reminders to behave in a different, rule-abiding manner. Although reminders can work in promoting rule compliance (Apesteguia, Funk, & Iriberry, 2013), there is evidence suggesting that individuals may not meet a deadline even when it is visibly profitable to do so (Ericson, 2017).

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This paper explores the issue of whether inattentive behavior can be detected in a typical information commons (libraries). Our empirical question of interest is the following: is there evidence of a specific kind of inattention in such a real-world setting? Employing a dataset comprising more than 300,000 daily transactions in libraries during a 10-year period, we use a specific and approximated measure of inattention given by the number of borrowed books per library user not returned when they are due. Libraries arguably constitute an appropriate real-world setting for studying inattention, as they clearly establish specific return dates for items checked out by users, and also send electronic reminders before (and after) they are due back.

When testing for the possible occurrence of inattention in our data on the behavior of library users, we distinguish between two competing plausible explanations for inattention in general suggested in the related literature: one based on procrastination behavior (Ericson, 2017), and the other based on strategic considerations (Guiso, Sapienza, & Zingales, 2013). If the former prevails over the second type of salient inattention in our specific setting, then one could possibly expect to find a higher proportion of return delays on dates in which procrastination is likely to be more frequent, such as days immediately before weekends, for example. Meanwhile, if strategic considerations, such as keeping a book for a longer period in order to prepare for an exam, are more relevant, then one could possibly expect to detect a higher proportion of return delays in days before exams.

As a preview, our main results suggest that in our specific setting inattention, as measured by delays in returning borrowed books, is mostly a procrastination phenomenon. These results contribute to a growing literature on the empirical measurement of inattention, with a fitting emphasis on exploring the potential impact of reminders as an inattention-reducing device (Apesteguia et al., 2013; Ericson, 2017). By measuring inattention as the average number of book return delays in libraries, we provide a new proxy for an important behavioral bias (Gabaix, 2019). This measure has the advantage of being directly observable and considerably easier to interpret, when compared to previous measures reported in the finance literature, for instance, which could be subject to noise and other types of bias derived from the methodology used to build them (Barber & Odean, 2008; Dellavigna & Pollet, 2009; Hirshleifer, Lim, & Teoh, 2009).

## 2. Materials and methods

We study the behavior of library users covering more than 300,000 transactions during a 10-year period. We have access to rich confidential daily data related to users of three libraries from a private educational institution in the city of São Paulo, Brazil, for the 2005–2015 period. The original data contain detailed information on 17,498 individual users, covering 785,550 daily transactions. We limit our analysis to book return delays, only. In doing so, we restrict the original sample to 310,726

transactions, by 8,045 users. We justify this choice based on the conveniently quantifiable fact that, once a user has a book return delay, he or she starts receiving periodic e-mail reminders through an electronic system adopted by the library (*Pergamum*).<sup>1</sup>

The data contain information on users' socioeconomic characteristics—such as their gender, date of birth, and address—as well as library's confidential information, with each user's identification number, category (high school,<sup>2</sup> undergraduate, master, graduate, former student, professor, and employee) and area of study (management, accounting, economics, international relations, advertising, and secretariat). To assess the importance of inattention in this setting, we estimate (1) via Ordinary Least Squares (OLS):

$$Y_{ist} = \alpha + \beta (\text{Day of the Week}) + X_{ist}\gamma + Z_{st}\lambda + \delta_t + \theta_{st} + \varepsilon_{ist}. \quad (1)$$

Here,  $Y_{ist}$  represents the delay for an individual  $i$ , in library  $s$ , at instant  $t$ . The term “*Day of the Week*” corresponds to an indicator variable, which assumes unity value for each weekday, and 0, otherwise. We include user and library characteristics as controls in the regressions below (captured by the term  $\alpha$ ), as well as time trends ( $\delta_t$ ). We also consider alternative ways to control for the existence of distinct time trends in different libraries, by including monthly and yearly trends for each library in the sample (captured by the  $\lambda$  and  $\theta$  terms). In the case of the term  $\varepsilon_{ist}$ , it has a conditional mean of zero,  $\mathbb{E}(\varepsilon_{ist}|s, t) = 0$ . The parameter of interest in this context is  $\beta$ , which we use as an approximate measure of inattention. It is worth noting that the estimates reported herein do not have a causal interpretation.

### 3. Results

Table 1 presents the results of estimations for the 2005–2015 period. The dependent variable corresponds to the number of delays by each library user in the period. In the table's columns, we add covariates to the specifications to control for time-invariant characteristics of users and libraries. Each column reports estimates for a specific day of the week. The last column contains estimates for all days of the week, excluding Sunday. In all these cases, we cluster standard errors by the number of courses offered at the institution.<sup>3</sup>

<sup>1</sup>This system provides technology services for several libraries in Brazil. Users receive reminders one day before the return of the book is due, and one day after such due date. After that period, they start receiving reminders every three days for each library item they have borrowed and not returned.

<sup>2</sup>The private institution under study also offers secondary education equivalent to the high school level in the U.S. High School students comprise 1.37% of the student body during the 2005–2015 period.

<sup>3</sup>There were 219 such courses offered during the 2005–2015 period. These courses differ with respect to areas of study (management, economics, accounting, international relations, advertising, and secretariat) that a student may choose when he or she enrolls in the institution.

**Table 1.** Delays in Weekdays OLS Estimates, 2005–2015

Variables	(1) Delays	(2) Delays	(3) Delays	(4) Delays	(5) Delays	(6) Delays	(7) Delays	(8) Delays
Monday	-0.16*** (0.006)							0.10*** (0.008)
Tuesday		-0.11*** (0.007)						0.14*** (0.009)
Wednesday			-0.01*** (0.005)					0.21*** (0.009)
Thursday				0.11*** (0.010)				0.32*** (0.012)
Friday					0.26*** (0.010)			0.45*** (0.013)
Saturday						0.07*** (0.008)		0.29*** (0.012)
Sunday							-0.23*** (0.008)	
User Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Library Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Libraries × Months	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Libraries × Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	310,726	310,726	310,726	310,726	310,726	310,726	310,726	310,726
Adj. R <sup>2</sup>	0.0764	0.0708	0.066	0.0704	0.0868	0.067	0.0705	0.106

Notes: (a) The dependent variable in the specifications corresponds to the average delays (in days) per user in each library studied in this paper. (b) Standard errors clustered by course (reported in parentheses). (c) “User Characteristics” correspond to a set of dummies for users’ gender (female = 1), academic financial support (scholarship = 1), group ages (18–23, 24–30, 31–40, 41–50, 51–60, 60+), category (undergraduate, master, graduate, and former student, employee, and professor), area of study (management, accounting, economics, advertising, international relations, and secretariat), and time at college (0 to 4 years). (d) “Library Characteristics” correspond to a set of dummies for each library in the sample, including their location, and staff size, as well as their composition of books (management, accounting, economics, and law). (e) The terms “Libraries × Months” and “Libraries × Years” correspond to interactions between libraries and months and libraries and years, respectively. (f) Statistical significance: \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

The results in the table suggest the occurrence of a day of the week effect: inattention, as approximately measured by delays in returning checked out books, is consistently higher on Fridays. Besides, these results suggest that the inattention focused upon here might be mostly a procrastination phenomenon. In fact, delays are considerably higher on Fridays, either in the case of estimations for individual weekdays (26% higher than other days of the week), or in the case of all weekdays (45% higher than delays on Sundays).

In Table 2, we report the results of estimations based on (1), but considering the influence of exam weeks, only. We do this to verify whether alternative events that could possibly proxy for inattention also affect return delays, perhaps favoring the view that inattention might be strategic in nature. Given that we have access to

**Table 2.** Delays during Exam Weeks OLS Estimates, 2005–2015

Variables	(1) Delays	(2) Delays	(3) Delays	(4) Delays	(5) Delays	(6) Delays	(7) Delays
Exams	0.06*** (0.011)						
Exams ( $t - 1$ )		-0.02*** (0.009)					
Exams ( $t - 3$ )			-0.03*** (0.007)				
Exams ( $t - 7$ )				-0.02*** (0.008)			
Exams ( $t + 1$ )					-0.02*** (0.006)		
Exams ( $t + 3$ )						-0.02** (0.008)	
Exams ( $t + 7$ )							-0.02*** (0.007)
User Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Library Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Libraries $\times$ Months	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Libraries $\times$ Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	310,726	310,725	310,724	310,722	310,725	310,724	310,721
Adj. R <sup>2</sup>	0.0665	0.0661	0.0661	0.0661	0.0661	0.0661	0.0661

Notes: (a) The dependent variable in the specifications corresponds to the average delays (in days) per user in each library studied in this paper. (b) Standard errors clustered by course (reported in parentheses). (c) "User Characteristics" correspond to a set of dummies for users' gender (female = 1), academic financial support (scholarship = 1), group ages (18–23, 24–30, 31–40, 41–50, 51–60, 60+), category (undergraduate, master, graduate, and former student, employee, and professor), area of study (management, accounting, economics, advertising, international relations, and secretariat), and time at college (0 to 4 years). (d) "Library Characteristics" correspond to a set of dummies for each library in the sample, including their location, and staff size, as well as their composition of books (management, accounting, economics, and law). (e) The terms "Libraries  $\times$  Months" and "Libraries  $\times$  Years" correspond to interactions between libraries and months and libraries and years, respectively. (f) Statistical significance: \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

official institution information, we can build specific dates for exams, as well as close dates (one day, three days, and seven days before and after each event).

In the case of the results reported in Table 2, we could not find a robust empirical pattern consistent with or suggestive of the presence of strategic inattention as defined earlier. For most specifications, there is not a robust pattern in delays in returning borrowed library books across these dates. In the case of exam weeks, there is a contemporaneous rise in delays, accompanied by reductions in close dates. These results are hard to reconcile with inattention explanations based on strategic considerations. We conclude that there is a significant effect of Fridays on return delays that might be associated with inattentive behavior mostly due to procrastination.<sup>4</sup>

<sup>4</sup>In the Appendix, we present several robustness checks reinforcing the main results reported in this section.

## 4. Conclusion

This note provides evidence on inattention in an information commons. We report evidence of the occurrence of a day of the week effect: inattention, as approximately measured by delays in returning books checked out from a library, is consistently higher on Fridays, when compared to any other day of the week. The empirical results reported in this paper suggest that the kind of inattentive behavior in an information commons explored in this paper might be mostly a procrastination phenomenon, instead of based on strategic considerations. Thus, further theoretical and empirical research along these lines of investigation is warranted.

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## Appendix. Tables

This Appendix contains the results of several tests aimed at checking the robustness of the main empirical results reported in the paper. In tables 3 to 6, we present estimates of our approximate measure of inattention based on distinct samples. Table 3 reports results for distinct library units (Liberdade, Largo do São Francisco (San Fran), and Pinheiros). Table 4 contains results by user category (high school, undergraduate, master, graduate students, former students, employees, and professors), whereas Table 5 contains results for distinct areas of study (management, accounting, economics, international relations, advertising, secretariat, and other courses). Finally, Table 6 shows the results of estimations for samples based on the time that users have been in the institution (0 year, 1 year, 2 years, etc.). In all cases, we want to check whether the main results are robust to minor changes in the original sample.

According to the additional results reported in this Appendix, we can conclude that the results discussed in section 3 remain qualitatively valid. This lends further support to our inference about the occurrence of a day of the week effect in the time pattern of the specific variety of inattentive behavior in an information commons explored in this paper.

**Table 3.** Robustness: Delays by Library Unit OLS Estimates, 2005–2015

Variables	(1) Liberdade	(2) San Fran	(3) Pinheiros
Friday	0.26*** (0.010)	0.23*** (0.025)	0.26*** (0.035)
User Characteristics	Yes	Yes	Yes
Library Characteristics	Yes	Yes	Yes
Libraries × Months	Yes	Yes	Yes
Libraries × Years	Yes	Yes	Yes
Observations	279,043	28,278	3,405
Adj. R <sup>2</sup>	0.0883	0.0748	0.0865

Notes: (a) The dependent variable in the specifications corresponds to the average delays (in days) per user in each library studied in this paper. (b) Standard errors clustered by course (reported in parentheses). (c) "User Characteristics" correspond to a set of dummies for users' gender (female = 1), academic financial support (scholarship = 1), group ages (18–23, 24–30, 31–40, 41–50, 51–60, 60+), category (undergraduate, master, graduate, and former student, employee, and professor), area of study (management, accounting, economics, advertising, international relations, and secretariat), and time at college (0 to 4 years). (d) "Library Characteristics" correspond to a set of dummies for each library in the sample, including their location, and staff size, as well as their composition of books (management, accounting, economics, and law). (e) The terms "Libraries × Months" and "Libraries × Years" correspond to interactions between libraries and months and libraries and years, respectively. (f) Statistical significance: \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

**Table 4.** Robustness: Delays by User Category OLS Estimates, 2005–2015

Variables	(1) High School	(2) Undergraduate	(3) Master	(4) Graduate	(5) Former Stdt.	(6) Employee	(7) Professor
Friday	0.33*** (0.030)	0.28*** (0.006)	0.03 (0.072)	0.25*** (0.013)	0.27*** (0.021)	0.19* (0.106)	0.03* (0.017)
User Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Library Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Libraries × Months	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Libraries × Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,253	207,134	9,995	69,716	12,296	1,109	6,223
Adj. R <sup>2</sup>	0.0891	0.0697	0.113	0.0704	0.0878	0.152	0.111

Notes: (a) The dependent variable in the specifications corresponds to the average delays (in days) per user in each library studied in this paper. (b) Standard errors clustered by course (reported in parentheses). (c) "User Characteristics" correspond to a set of dummies for users' gender (female = 1), academic financial support (scholarship = 1), group ages (18–23, 24–30, 31–40, 41–50, 51–60, 60+), category (undergraduate, master, graduate, and former student, employee, and professor), area of study (management, accounting, economics, advertising, international relations, and secretariat), and time at college (0 to 4 years). (d) "Library Characteristics" correspond to a set of dummies for each library in the sample, including their location, and staff size, as well as their composition of books (management, accounting, economics, and law). (e) The terms "Libraries × Months" and "Libraries × Years" correspond to interactions between libraries and months and libraries and years, respectively. (f) Statistical significance: \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

**Table 5.** Robustness: Delays by Course OLS Estimates, 2005–2015

Variables	(1) Management	(2) Accounting	(3) Economics	(4) Int.Relations	(5) Advertising	(6) Secretariat	(7) Other
Friday	0.26*** (0.015)	0.25*** (0.021)	0.28** (0.010)	0.29* (0.039)	0.32*** (0.004)	0.32* (0.033)	0.18*** (0.057)
User Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Library Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Libraries × Months	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Libraries × Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	101,547	117,718	42,696	11,722	14,520	6,832	15,691
Adj. R <sup>2</sup>	0.0694	0.0926	0.0706	0.0858	0.088	0.0767	0.141

Notes: (a) The dependent variable in the specifications corresponds to the average delays (in days) per user in each library studied in this paper. (b) Standard errors clustered by course (reported in parentheses). (c) "User Characteristics" correspond to a set of dummies for users' gender (female = 1), academic financial support (scholarship = 1), group ages (18–23, 24–30, 31–40, 41–50, 51–60, 60+), category (undergraduate, master, graduate, and former student, employee, and professor), area of study (management, accounting, economics, advertising, international relations, and secretariat), and time at college (0 to 4 years). (d) "Library Characteristics" correspond to a set of dummies for each library in the sample, including their location, and staff size, as well as their composition of books (management, accounting, economics, and law). (e) The terms "Libraries × Months" and "Libraries × Years" correspond to interactions between libraries and months and libraries and years, respectively. (f) Statistical significance: \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .



**Table 6.** Robustness: Delays by Time at the Institution OLS Estimates, 2005–2015

Variables	(1) 0 year	(2) 1 year	(3) 2 years	(4) 3 years	(5) 4 years	(6) 5+ years
Friday	0.29*** (0.015)	0.28*** (0.011)	0.26*** (0.013)	0.24*** (0.007)	0.21*** (0.029)	0.21*** (0.034)
User Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Library Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Libraries × Months	Yes	Yes	Yes	Yes	Yes	Yes
Libraries × Years	Yes	Yes	Yes	Yes	Yes	Yes
Observations	69,779	82,025	59,960	46,110	15,599	37,253
Adj. R <sup>2</sup>	0.0925	0.0875	0.0837	0.0733	0.0638	0.103

Notes: (a) The dependent variable in the specifications corresponds to the average delays (in days) per user in each library studied in this paper. (b) Standard errors clustered by course (reported in parentheses). (c) "User Characteristics" correspond to a set of dummies for users' gender (female = 1), academic financial support (scholarship = 1), group ages (18–23, 24–30, 31–40, 41–50, 51–60, 60+), category (undergraduate, master, graduate, and former student, employee, and professor), area of study (management, accounting, economics, advertising, international relations, and secretariat), and time at college (0 to 4 years). (d) "Library Characteristics" correspond to a set of dummies for each library in the sample, including their location, and staff size, as well as their composition of books (management, accounting, economics, and law). (e) The terms "Libraries × Months" and "Libraries × Years" correspond to interactions between libraries and months and libraries and years, respectively. (f) Statistical significance: \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .