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Information behavior underground: New York City, Paris

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Abstract

People who live in large metropolitan areas spend a vast amount of time on public transportation, including the subway. Yet there are very few studies that examine commuters' information behavior. We conducted a study of information behavior of commuters in two large metropolitan areas: New York City, USA and Paris, France. We found similarities and differences in the patterns of information consumption of French and American subway travellers. For example, one of the similarities between French and American riders is heavy readership of print media, especially books; one of the differences between the two groups is related to the much lower usage of electronic media by French riders. The article discusses the ways to integrate study methodology and findings into future work.

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1. Introduction

A significant number of people who live in large metropolitan areas use public transportation, including the subway system. In New York City (NYC) the number of people who rode the Metropolitan Transit Authority's (MTA) subway in 2011 was over 1.6 million [1]. The number of people who used Paris Metro in 2010 was over 1.5 million [2]. Yet, there is very little publicly available research on the information behavior of subway commuters.

We developed a study to investigate media consumption trends of the subway riders in two large metropolitan areas, NYC and Paris, and to examine the similarities and differences between American and French riders. We thought that study would be timely for several reasons:

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- 1) at the time of the study, the MTA planned to introduce wireless service on its underground sections [3], so we were interested in examining how many riders have smart phones or other internet-enabled devices and would benefit from a new service (Paris underground commuters already have wireless service so we were interested in examining how their mobile device uses differ from that of New Yorkers);
- 2) the commute offers a unique transitional time when the riders can shift their identities [4], choose to continue working on the tasks they were engaged in prior to taking the ride, prepare for the tasks that await them or simply relax. Understanding of commuters' activities can inform the development of targeted products and services to address commuters' information needs;
- 3) Subway riders represent diverse urban population, and we thought that examination of technology use by commuters would be a good proxy for the technology use by a wider community.

The paper reviews previous studies of commuter's information behavior, describes methodology and results of the two-part investigation of NYC and Paris subway riders and discusses the implication of the study findings to future work.

2. Relevant Literature

While scientific literature on the information behavior of commuters is scarce, we found several models that describe information-related activities of travelers.

Subjective experiences of the short-term traveling are explored in Flamm [5]. The author found that travelers attempt to make use of their travel time, and engage with the number of activities, including a) productive, b) relaxation and transition related activities, and c) social activities. In Flamm's classification, productive activities relate both to work and leisure. Examples of work-related activities include planning tasks and working with documents, while relaxation activities include listening to music, daydreaming, dozing and playing games. Per Flamm classification, social activities include observations of surroundings and tasks related to maintaining social relationships with family and friends.

Brossard, Abed, Kolski, and Uster [6] reviewed several classifications of commuters' behaviors, including one based on the study by Viatic Mobilite team. Viatic researchers used zoomorphic labels to define the categories of commuters based on levels of concentration and openness to others, including (1) beavers that engage in productive activities, (2) owls that feel lost and look for information, (3) peacocks that are showing off, and (4) marmots that rest [6].

Similar classification is mentioned in the Akesson and Nilsson [7] who report on car commuters' behavior. The authors identify categories of the commuters activities include vocational (e.g. document reading), mundane (e.g. contacting friends) and traffic-related activities. The study explored possible desired activities that commuters would have preferred to engage in and discovered that these activities also evolved around the same three categories.

While the reviewed classifications differ by the type of included travel activities and methods used to investigate them, all models include some forms of productive and leisurely activities.

A number of the examined publications focused on the specific uses of information devices by commuters or travel-related applications for these devices. Grasi, Gaggioli, and Riva [8] found that students who used mobile devices during their commute to listen to music and watch video were less stressed, and felt the sense of accomplishment during their commute. Similar finding is reported by Lyons and Urry [9]. The authors note that technology enables commuters to use travel time more productively, and leads to increase use of public transportation. Paez and Whalen [10] examined university students' attitudes toward their commutes and found that students seemed to enjoy their commute more if they were able to engage in a productive activity (e.g., doing work while sitting on a bus versus doing nothing while driving a car.) Colbert and Livingstone [11] examined ways to increase mobile technologies usefulness during commute. The authors did not find any clear patterns regarding preferable public transportation conditions for the use of technology. Individual preferences or annoyances varied widely: some participants reported feeling comfortable making calls on a bus or train because it could provide a quiet and comfortable environment for the conversation, while others felt uncomfortable making calls in public.

A number of publications on the web and in the popular media report the results of the casual observations of travelers' behaviors, attesting to the emerging public interest in the topic of information use under-ground. Several blogs discuss various uses of an Apple iPad by the UK and US commuters [12, 13] and uses of smartphones for gaming [14]. Several articles in The New York Times newspaper looked at how New Yorkers are spending their time on the train. Mainland [15] observed and interviewed NYC subway riders to understand their reading habits and concluded that the lack of Internet and mobile service access on the subway keeps New Yorkers reading books rather than using electronic devices.

In summary, prior studies of travelers' behaviors reflect diversity of commuting experiences, and preferences for various types of activities and information devices. Our study extended prior work by broadening the focus and examining the use of a wide variety of information devices on the NYC and Paris subway systems. The study also compared behavior of the NYC commuters with their French counterparts, and validated some of the commuters' behavior models suggested in prior publications.

3. Methods

The data for the study was collected through observations, survey, and interviews. We operationalized commuters' information behavior as observable interactions (or lack thereof) with information media. The study aimed to address the following research questions:

1. What information activities subway commuters engage in?
2. What types of information devices they use?
3. Does availability of wireless service underground effects commuters' uses of information devices?
4. What are the major differences between NYC and Paris commuters?

In order to examine the distribution and uses of information devices on the NYC subway, a series of observations were made in the fall of 2010. Eight re-searchers made 154 observations of 15 MTA subway lines. 4,461 passengers were observed during different times of day and on various lengths of commute. Observations of the 7 Paris metro lines were made by two researchers in the spring of 2011; 30 observations were made, with the total number of 1,238 passengers observed at different times of day and various length of commute. While our observations did not cover every NYC and Paris subway line, we observed the lines that connect different parts of the city and we feel that our sample is representative of the subway population. Our observations were also conducted at various times of the day, and on various days of the week.

The observers performed unconcealed participant observations, but tried to remain discreet while making the observations. During each observation, field notes were taken in small notebooks or mobile devices. Each observation consisted of a count of passengers and a breakdown of print format and electronic devices being used by those passengers.

The types of print and electronic media counted in observations were based on the results of a pilot study that identified the types of devices and activities that are observable on the NYC MTA trains. Based on the results of the pilot observations, a list of electronic devices to be counted was determined and included e-readers, laptops, music players, gaming devices and smartphones. Because we were interested in different types of interactions with the devices, we counted several types of observable activities on smartphones and similar multi-use devices (e.g., reading from a mobile device and playing a game on a mobile device were counted as two different uses of the same device). Due to the privacy concerns, we were unable to observe the media interfaces, and inferred how the device was being used from the body-language clues.

We counted interactions with five traditional print media, including books, magazines, printouts, notebooks, and newspapers. We also differentiated between and counted two types of passive activities: 1) staring at ads on the walls of a subway car, and 2) doing nothing. Staring at ads in a subway car is a conscious effort to obtain information from the source intended to provide information; however it does not involve possession and/or use of specific information device. We classified activity as "staring" when a passenger fixed their gaze on a poster for a few consecutive seconds.

4. Results

Most of the observed commuters in both cities did not engage with any type of information media (see Table 1). The most common activity among NYC commuters who used information devices was listening to music on a mobile device, followed by reading or typing on a mobile device, reading books, newspapers, and magazines. Other activities were observed less than 2% of the time. The distribution of information device use by Paris commuters was somewhat different. After ‘doing nothing’, book reading was the most popular activity, followed by music listening, newspaper and magazine reading, making phone calls, reading on mobile devices, playing games and writing in a notebook. We did not observe any Paris commuters using e-readers or laptops on a train, and due to the differences in seating arrangement and advertisements’ placements compared to the NYC subway, we were unable to observe staring at the car walls in Paris.

Table 1. Information devices observed on the NYC and Paris underground trains.

Activity Type	NYC			Paris		
	n	%	rank	n	%	rank
Doing nothing	2348	52.6	1	807	65.2	1
Listening to music on a mobile device	756	16.9	2	109	8.8	3
Reading or typing on a mobile device	353	7.9	3	26	2.1	7
Reading books	336	7.5	4	146	11.8	2
Reading newspaper	226	5.1	5	69	5.6	4
Reading magazines	97	2.2	6	37	3.0	5
Making mobile phone calls	85	1.9	7	28	2.3	6
Staring at advertising on the walls of the train	71	1.6	8	0	0.0	n/a
Playing a game on a mobile gaming device	67	1.5	9	11	0.9	8
Reading from printouts	62	1.4	10	0	0	n/a
Reading from e-reader	36	0.8	11	0	0.0	n/a
Reading or writing in a notebook	17	0.4	12	4	0.3	9
Using laptop	7	0.2	13	0	0.0	n/a
total	4,461	100.0		1,238	100.0	

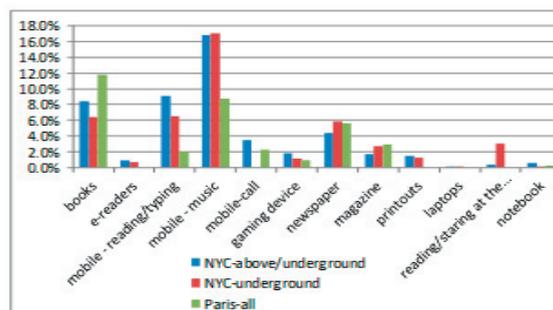


Figure 1. Distribution of devices/activities in trains with/without wireless service

We also examined the distribution of device uses in trains that had wireless service (above ground NYC and all Paris trains) and did not have wireless service (underground NYC trains.) While the number of certain activities requiring wireless connection went up on the trains with wireless access (e.g., using mobile phones for making calls, reading and typing), we did not see dramatic increase in these activities compared to the trains without wireless connection (see Fig. 1).

5. Discussion

In this section we discuss our findings, and focus on 1) the types of information activities subway commuters engage in; 2) the types of devices they use; 3) the differences in information activities on the trains with and without wireless service, and 4) the differences between NYC and Paris underground commuters.

Previous studies classified commuters' behaviors into several categories related to the level of engagement with the activity, and the situational factors influencing that activity. Our analysis resulted in a similar classification and included the following categories: 1) Active: activities that involve constant back-and-forth interaction with the information medium, including reading, emailing, texting, calling, and gaming; 2) Passive: activities that do not involve proactive interactions with information medium or surroundings, including music listening and resting.

One of the most frequently observed activities on MTA and Paris Metro commute was reading. The reasons for popularity of reading on a subway are outlined in [15], who suggests that the subway commute offers a time of quiet and solitude, and that many travellers prefer to use this time wisely (also supported by [8]).

The distribution and types of reading media varied between NYC and Paris, and also depended on the time of the day (e.g., newspaper reading was high in the mornings, [16]). Book was the most popular reading medium in both cities. In Paris, the percent of book readers was higher than in NYC, while the percent of electronic devices lower. This finding can be related to the rates of technology adoption in two countries (e.g., mobile usage is higher in U.S. than in Europe, [17]). The finding can also be attributed to other cultural and socio-economic differences between New Yorkers and Parisians. Future studies might focus on investigating these variables along with opportunities for information institutions to better satisfy commuters' reading needs (e.g., California library system introduction of book vending kiosks on several train stations [18]).

In addition to books, both NYC and Paris underground commuters were observed reading newspapers, magazines and printouts. We observed that the use of these media is relatively low and varies during different times of the day. For example, newspaper reading peaks in the morning, and can be correlated to commuters' habit to read their news on the way to work [19], distribution of free publications (e.g., Metro-New York and Metro-Paris free newspapers), and other factors.

The most frequently observed electronic device used on a subway was the smartphone. This finding can be related to the high ownership of smartphones [20], the device's portability and multi-functionality. While we observed the phones being used for reading, accessing music, typing, and gaming, future research might focus on investigating the distribution of specific work or leisurely tasks performed on a phone. It would also be interesting to investigate the uses of smartphone applications targeted for commuters, such as applications that offer region-specific content, learning and gaming applications, and other content (<https://market.android.com/>):

For information institutions and businesses it might also be fruitful to look into opportunities to enrich travel experience by offering loans of mobile applications or hardware for the duration of a journey.

We observed a relatively low number of e-readers and iPads in NYC and none in Paris. This observation might reflect a relatively low market penetration of such devices, which in turn might be related to their relatively high cost and user preferences for reading print media.

In addition to reading, other commuters' activities that required travellers' active attention included typing on the phones and making phone calls. Before conducting our study, we hypothesized that the number of calls made from mobile phones would be significantly higher in areas where wireless service is available (above ground in NYC, and underground in Paris.) Our initial hypothesis was not confirmed. While in NYC the number of calls went up in the trains that travelled above ground, the increase was not significant. In addition to the small increase in mobile calls on the above ground trains in NYC; other activities (e.g., doing nothing and reading books) increased as well. Considering availability of wireless service in the Paris Metro system, we were surprised to discover how "unpopular" that activity was among Parisians (making phone calls was number six activity after doing nothing, reading books, listening to music, readings newspapers and magazines). It appears that availability of wireless service is no guarantee of a significant increase in mobile calls; it might, however, increase the data usage needed for reading, video content viewing, and other activities. Future studies should consider investigating cultural norms associated with the use of mobile phones in closed public spaces (for

example, the study of [11] mentioned above found that commuters attitude towards calling in public was split). The study of mobile phone use in public spaces might be especially timely considering the NYC MTA decision to implement an underground wireless network [3]. By 2016 it is estimated that 277 NYC stations will support wireless service on the subway platforms, with a possibility of wireless signal reaching into subway cars. While availability of wireless can address some commuters' needs (e.g., ability to access data), it is also likely to conflict with other commuters' preferences for quiet time during the commute.

We classified playing games as active behavior since it requires constant interaction with information media. The observation data (and survey data not reported in this paper) indicate that the majority of games played during commute are on smartphones or similar multi-function devices, and not on game-specific devices. While playing games provides an entertaining pastime, it also requires certain environmental conditions, such as availability of seating to free both hands for handling the device. Future studies might focus on examining the relationships between gaming and environmental conditions as well as exploring demographic characteristics of subway gamers. Some of the observed gamers, e.g., a middle-aged well-dressed woman, did not meet a typical gamer stereotype suggesting that, perhaps, the commute offers a unique anonymous environment that accommodates identity changes [4].

We classified less industrious activities, such as listening to music and not interacting with any devices, as passive. We found that listening to music is a popular form of entertainment for commuters. The popularity of this activity could be related to the need to create personal space or the fact that this activity could be pursued in parallel with other activities (e.g., some commuters had headphones on while using their smartphones for reading and typing or reading print material.)

Despite availability of a large number of print and electronic media for underground use, the majority of the observed commuters in both cities did not use any information devices. Future studies should consider investigating factors that might influence commuters' decisions not to engage with any information devices, such factors might include length of commute (e.g. on short commutes there might not be time to engage with a device), need to rest or meditate, ownership of devices, and other factors.

In summary, we found both similarities and differences in the information behavior of NYC and Paris underground commuters. In both cities, travellers were engaged in similar types of activities, including reading, listening to music and making phone calls. However, the use of specific information devices for performing these activities and ways of engaging with these devices differed. For example, Parisians' favorite reading device was a book, while New Yorkers were more actively engaged with electronic media, especially smartphones. While travellers in both cities used their mobile phones for making calls, Parisians almost exclusively used headphones and bud microphones during the conversations while New Yorkers talked directly into the device.

During our observations, presence of the wireless service on trains did not dramatically affect commuters' behavior (see Fig. 1). In NYC, the number of reading, texting and calling slightly increased on the above-ground trains where wireless signal was available. In Paris, where a wireless signal is available on all the underground trains, use of mobile devices was relatively low compared to the readership of traditional print media. This and other observations lead us to believe that the differences in commuters' activities and media choices can be attributed to differences in social and cultural norms and to a lesser extent to the different environmental conditions such as wireless access, lighting, in-car ads, and other factors.

6. Conclusion

Our study explored information behavior of NYC and Paris subway riders in order to understand what they do on the train, what information devices they choose to use, and whether there are any differences in information behavior of New Yorkers and Parisians.

Our findings are consistent with previous commuter information behavior models and suggest the existence of active and passive categories of commuters. In both NYC and Paris, the majority of travellers fell into the "passive" category and chose not to engage with any information devices during the subway ride. The nature and causes of "passive" activities (e.g., resting, meditating, planning or observing the surroundings) need further investigation. In the context of our study we found it interesting and somewhat unusual that despite the high rate of information technology adoption and availability of wireless service (partial wireless in NYC), most

commuters chose an inactive pastime. Perhaps for some of these travellers, the commute can be improved with the new information services (e.g. in-car news broadcasting), while for others the commute remains one of the few opportunities to have a relatively quiet and uninterrupted time to relax and “switch gears” between different types of routine activities (work/home), which they would prefer not to change.

Among the activities of “active” commuters the most frequent were book reading and engaging with a mobile device. Considering the availability of various reading media, books continue to remain an attractive option. Anecdotal evidence suggests that subway readership is on the rise [21]. Future studies might investigate the reasons for the popularity of books, including their relatively low cost, independence from wireless connection and power sources, physical characteristics, and other factors. Another popular information device used on the subway was the smartphone. We found commuters using this device for reading, writing, listening to music, playing computer games, and calling. This finding is not surprising considering portability and multi-functionality of the smartphones. What we found surprising was the fact that we observed lower usage of smartphones by Paris commuters, despite wider availability of wireless service in the Paris Metro system. One of the explanations could be related to the difference in overall smartphone usage rates in NYC and Paris; another possible explanation that warrants further investigation could be related to cultural difference and perception of commute as productive time. After observing the Paris Metro, we are less certain that the introduction of wireless service on the NYC lines will lead to an immediate and/or significant increase in smartphones usage.

Our findings have direct implication for the design of information products and services for the underground commuters. Products similar to commercial and educational posters [22] and information/news screens [23] can target the attention of the “passive” travellers. Public libraries and other information institutions might investigate opportunities to offer their products and services to “active” commuters. An example of such product could be on-site landing of physical media (books) and digital content (e-books, digital movies).

Our exploratory study had a number of limitations. We used a convenience sample, which limits generalizability of our findings. We relied on observations and inferred certain behaviors from the observable actions, which might have had a different meaning. We did not observe all subway lines at all times of the day, and only glimpsed at a long list of all possible activities that were engaged in by commuters. However, we think that due to the demographic diversity of subway commuters, the information behavior trends of commuters might represent trends in a broader population.

In a fast passed environment of urban living, commuting offers a unique “transitional” experience and time to rest, stay in touch, get informed and entertained. It also offers a rich environment for information behavior investigations since it reflects social and cultural norms of the “above” ground community. We hope that our exploratory study has opened up a number of avenues for future research, such as studies of changes in city commuting, everyday information device use, commuters’ information needs and more. The comparison of the two large metropolitan areas highlighted the importance of considering social and cultural behavioral norms and preferences in the design of new information products and services.

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