TEMPORAL AND ANTECEDENT PATTERNS IN MAGAZINE AND NEWSPAPER READING

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Introduction

One of the more interesting and less traveled areas of readership research has to do not with reach and frequency measures nor reader engagement but rather the temporal frameworks within which printed materials are read. The patterns and rhythms of everyday life color and guide the activities that individuals participate in. This principle extends to the activities of interest to this conference – magazine and newspaper readership. It would be unrealistic and terribly naïve to think that the temporal distribution of magazine and newspaper readership is a uniform one. Therefore it becomes interesting and useful to examine the empirical distribution of this form of print readership across the 24 hours that make up a single day.

A second and coincidently less studied dimension of interest is the variety of antecedent events that precede magazine and newspaper readership activities. Temporal precedence is one of the key criteria for causality and while this paper makes no causal claims in any of its analyses, it is useful to know something about the type and probability of events that occur just temporally prior to magazine and newspaper readership. This paper will briefly describe some of the media consumption and life activity events that occur in a time period adjacent and prior to the time unit within which magazine or newspaper readership occurs.

Data

The data for this study comes from the combined waves 39 and 41 (Fall 2005) of Simmons' National Consumer Survey, a national probability sample of adults aged 18 years of age and older living in non-group quarters in the continental United States. A total of 24,136 respondents reside in the combined waves.

One of the challenges of gathering temporal data is the fact that it requires the respondent to chronicle their activities over the course of a contiguous time period - in this case 24 hours. This can be a task that taxes the resolve of respondents because of the burden of effort involved. In addition and related to this, a common issue that arises in diary data is the evaluation and definition of just what is a completed diary. Respondents often suffer fatigue when filling out activity diaries and may omit specific sections of the diary or fill out the diary up to a certain temporal checkpoint.

The issues outlined above present the researcher with some serious dilemmas. On the one hand it is tempting for the researcher to seek out patterns that they feel constitute a completed diary and often it is the case that there are many variations that the researcher feels qualifies as a completed measure. Further, the researcher must be careful not to choose their completion criteria with such specificity that there is the chance that it will introduce bias into the analyses.

Keeping these issues at hand, the criteria for judging a completed daily activities diary in the combined wave 39-41 data set was set broadly as follows. There are 24 one hour reporting periods in the daily activities diary, starting with 6am in the morning and ending with 5am the next morning. In addition, there are three broad categories of response sets within the diary – where were you, with whom and what were you doing. It was decided that the most conservative approach would be to assume that to be a complete diary would require a total of 72 checks – one for each of the three sections for each of the 24 hours in a day. After screening by this criteria, a total of 9,521 respondents met the completion qualifications.

Temporal Distribution of Total Magazine and Newspaper Readership

The first figure in the analysis, Figure 1, shows the percent of individuals who reported they read a magazine or newspaper in the corresponding time segment. The newspaper readership temporal pattern looks very intuitive. Starting early in the morning as people arise from a night's sleep they turn to reading the newspaper. The number of readers increases during the next hour as more people awaken and then the incidence of newspaper readership gradually then more quickly declines as many individuals prepare for and start their workday.

It is interesting to note however, that the drop is not as precipitous as one might expect – this may be due to readers who may be retired, homemakers, shift workers, students or others with more flexible schedules. Post one o' clock in the afternoon note that newspaper readership has hit a local minima and begins a gradual climb again with a local maxima at 8 o'clock, after which there is a second attrition period as individuals prepare for bed.

Figure 1
Magazine and Newspaper Reading by Hour
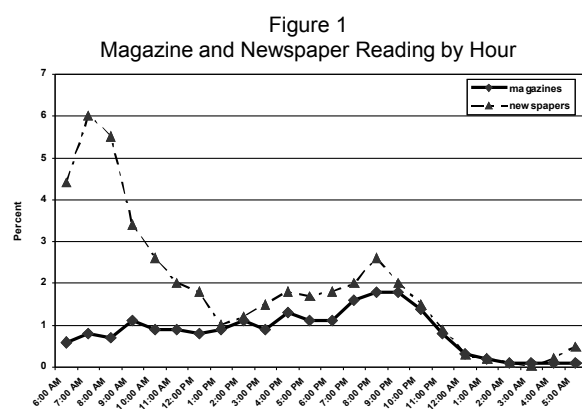
Magazine readership on the other hand shows a much less remarkable picture with a slow, steady increase in readership from early morning to peak again around the same 8 o' clock time period as did newspapers. The fact that these two readership curves tend to have symmetries in the 6pm time period onward suggests that there may be similar behavioral dynamics affecting both activities.

Magazine and Newspaper Readership by Gender

Analysis of magazine readership by gender is a staple in the reach and frequency measure world so it makes sense to examine this same demographic breakdown across temporal lines. Figure 2 illustrates the temporal distribution of magazine readership by gender. Note that the chronometric signature for men and women appears very similar, with both distribution curves following each other quite closely.

Figure 2
Magazine Readership by Gender by Hour

One interesting thing to note is that the women's curve tends to follow slightly under the men's except for the period around 1pm till 5pm in the afternoon. One possible explanation for this, without trying to frame it in sexist terms, is that for one segment of the magazine reading audience – women homemakers – this may a chance for them to carve out time to read a magazine without the pressures of household duties and attention needed by other family members (e.g. school-aged children and their fathers). Supporting this a bit further is the observation that in the very early morning hours women again have a very slight edge over men magazine readers, perhaps due to the fact that the rest of the family is asleep.
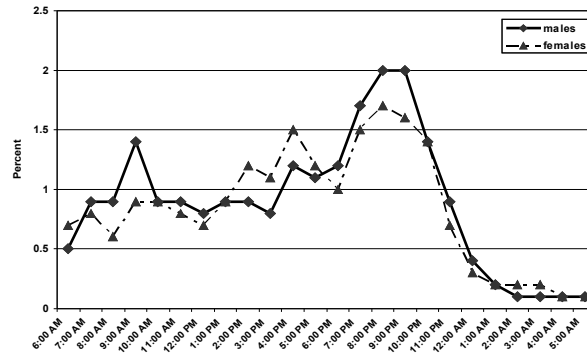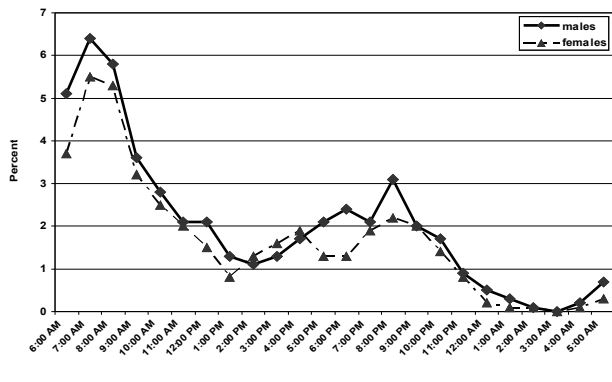
Figure 3
Newspaper Readership by Gender by Hour

Figure 3 contrasts the temporal patterns of men and women in regard to newspaper readership. Note again that for the most part these two demographic segments have very similar newspaper reading patterns, both mirroring the newspaper pattern found in the total population signatures found in Figure 1. Just as in magazines, note that there is a very slight edge in readership of women over men starting again at 1pm and ending some time around 4pm – again suggesting that perhaps this is the result of women homemakers carving out leisure time for themselves in the afternoon and enjoying reading the newspapers may be one of those leisure activities.

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Magazine and Newspaper Readership by Household Income

Household income is another variable often of interest to magazine and newspaper readership researchers. Figure 4 depicts the magazine readership behavior of three household income segments across time. It can be seen in the figure that there is a marked similarly between the two higher household income brackets while the lowest income segment is significantly different in the early part of the day. Note that besides the early evening spike in readership that is exhibited by all three income brackets, only two of the three household income groups show a pattern similar to the overall magazine readership pattern in the early

Figure 4
Magazine Incidence versus Household Income by Hour
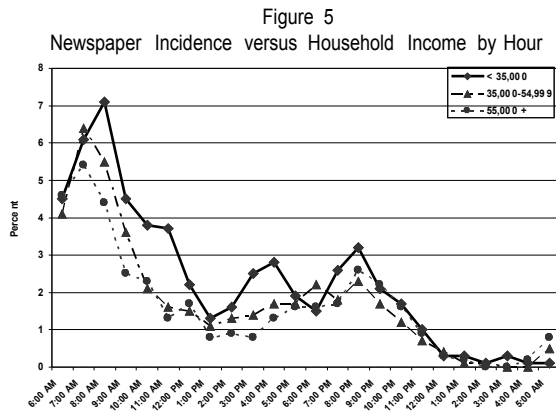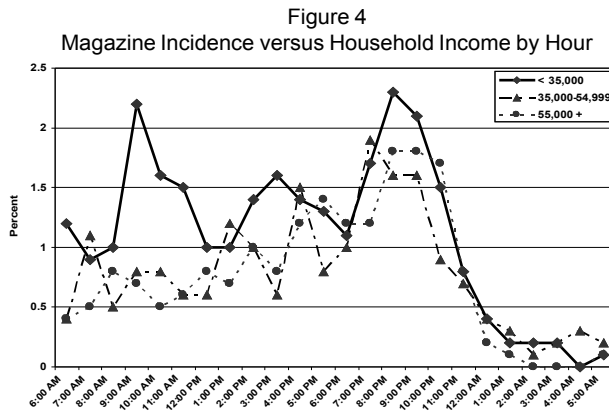
morning hours. For the lowest income segment there is a significant amount of variation in readership levels throughout the hours leading up to the dinner hour. One possible explanation for this is that perhaps the lowest household income segment contains a significant number of one-income households and so there in two person households there is one individual with more discretionary time on their hands in which they could choose to read a magazine. It could also be argued that there are a large number of lower income retired individuals in this segment and that this may also contribute to the deviation from the overall magazine readership pattern in this time period. In contrast, looking at the three household segment curves for newspaper readership in Figure 5, all three seem to have a remarkably similar pattern of readership distribution across time.

Figure 5
Newspaper Incidence versus Household Income by Hour

Magazine and Newspaper Readership by Age

Magazine readership across time for three age segments is illustrated in Figure 6 and there are some interesting differences among the groups. The 18-34 age group exhibits a much more uniform or "subdued" distribution curve compared to the other two age groups. It's a bit difficult to spot the evening primetime magazine readership period. The middle age group (aged 35-54) shows a similar slope to that of the 18-34 year olds until after 6pm when the evening primetime magazine readership period begins and then you begin to see the typical rise in readership incidence. Finally, the oldest age group (55+ years of age) reveals a magazine readership pattern that has significant variation to it, along with a much steeper increasing slope as the day progresses. Note that the prominent drops in magazine readership for this group tend to emerge around meal times – lunch and dinner – suggesting that for this age group meals and magazines don't mix.
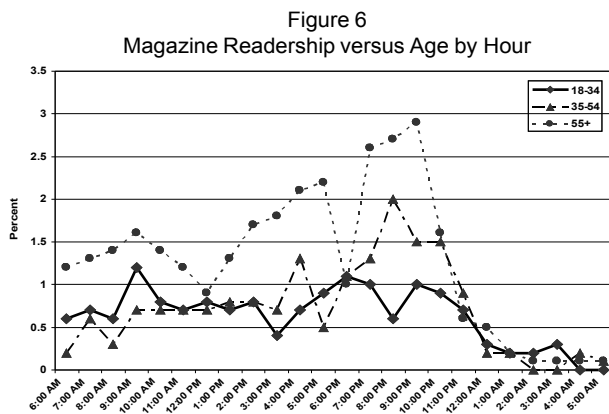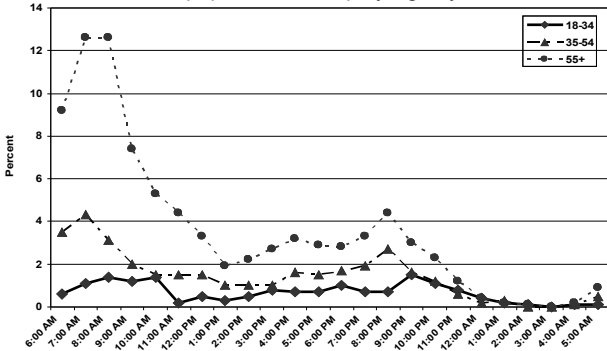
Figure 6
Magazine Readership versus Age by Hour

Figure 7
Newspaper Readership by Age by Hour

It is also interesting to note that the distribution curves for newspaper readership vary significantly by age group. As shown in Figure 7, the youngest age group, aged 18-34 years of age, have an almost uniform distribution across the hours of the day. For this group it seems that the old tradition of reading the newspaper at breakfast is almost lost. For the middle age group – aged 35-54 – we see a more typical pattern with a modest early morning readership peak – perhaps pre-commute – and the typical post-dinner peak as well. The oldest age group, those that are aged 55 and older, the readership curve across the day is much more dramatic – it appears perhaps from this pattern that perhaps this group is the one that has hung on to the old tradition of reading the newspaper in the morning. Once the early morning peak is over, the readership pattern for this group follows in parallel that of the next younger group, with a slightly exaggerated post-dinner readership peak.

Magazine and Newspaper Readership by Education

The last demographic variable to be examined is education. Figure 8 reveals that the three educational groups have reasonably similar readership signatures. One small difference is that the two higher educational level groups appear to have slightly steeper slopes going from early morning to the start of magazine primetime after 6pm. The second item of interest here is that the lowest educational group shows mealtime slumps in magazine readership, similar to those in the highest age bracket and in fact these may be the same or similar individuals.

Figure 8
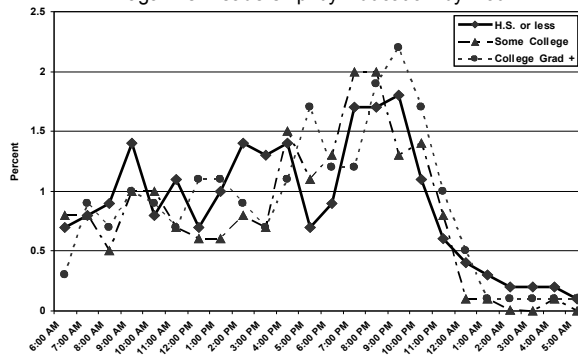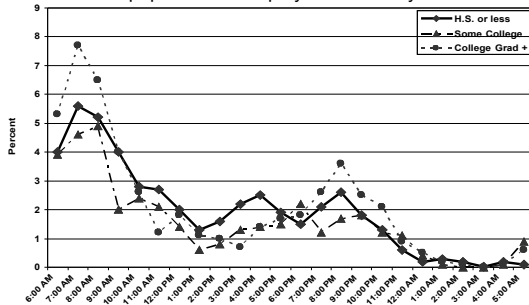**Magazine Readership by Education by Hour**

Figure 9
Newspaper Readership by Education by Hour

An even more symmetrical and similar temporal readership pattern can be seen for newspapers as revealed in Figure 9. The distribution of readership activity across the day by education shows that for the most part the curves follow parallel courses. One small item of note is the higher peak for college graduates for early morning readership, perhaps suggesting that they expect to read something that may help them during their workday.

Antecedents of Magazine and Newspaper Readership
One area of interest revolves around the type of activities engaged in temporally prior to reading a magazine or newspaper. Cataloging the type and incidence of activities may suggest behavioral triggers that might be linked to print readership. While the set of activities available for analysis in this manner is rather limited, it still may be constructive to examine at least a sub-sample of them. Table 1 reveals the mean probabilities of a subset of prior activities in the prior hour given that magazine reading occurs during the next sequential time period.

Table 1
Mean Probabilities of Selected Prior Activities for Magazines

watch tv	watch dvd	at movies	listen to radio	read newspaper	read book	listen cd/record/tape
0.27	0.05	0.02	0.17	0.14	0.10	0.08
net radio	net video	net newspaper	Buy on net	sleep	gather info on net	
0.03	0.02	0.03	0.09	0.10	0.07	

* note – more than one prior activity may be engaged in

The most likely activity that occurs in the hour prior to magazine reading, not surprisingly, is watching television. Note that other reading activities, such as reading a newspaper or reading a book, also have sensible mean probabilities which suggest that perhaps that once individuals start reading they may continue that activity even though they switch to another print medium.

A similar table of mean probabilities for prior events can also be constructed for activities prior to reading a newspaper. Table 2 displays the mean probabilities for selected prior activities. It is interesting to compare and contrast Tables 1 and 2. First there seems to be some asymmetry between the two tables – newspaper reading appears to have a somewhat higher prior mean probability of being a prior activity to magazine reading than the converse. Perhaps one reason this may be the case is the proclivity for individuals to read the newspaper first thing in the morning and magazine reading is likely to occur at some temporal point beyond that. Also of interest is the large difference in probabilities for purchasing something on the Internet. This might suggest that magazine advertising might be a better parallel media channel to deliver an advertising message that encourages people to purchase a product or service online.

Table 2
Mean Probabilities of Selected Prior Activities for Newspapers

watch tv	Dvd	at movies	listen radio	read mag	read book	listen cd/record/tape
0.34	0.03	0.01	0.12	0.09	0.09	0.02
net radio	net video	net newspaper	buy on net	sleep	gather info on net	
0.01	0.01	0.01	0.02	0.12	0.04	

* note – more than one prior activity may be engaged in

Suggestions for Further Analysis

Classical Basic Time Series Models
The temporal nature of the daily activities diary lends itself to suggesting that time series techniques may be one of the useful strategies in modeling some components of magazine and newspaper readership across the hours of the day. As an example, we can look at the total newspaper readership by hour data from Figure 1. A visual examination of the ACF correlogram reveals a positive and decaying pattern that confirms that suspicion. After one round of differencing and removal of the mean, estimation of several models revealed an $ARMA_{2,1}$ model to provide the best fit of the models entertained:

$X_{(t)} = 1.118\ X_{(t-1)} - .4359\ X_{(t-2)}\quad + Z_{(t)} - 1.186\ Z_{(t-1)}$
Ar_{t+1} is sig at .p < 05 level

Survival Analysis – Kaplan Meier
You might also consider looking at the temporal data in terms of survival analysis. That is, it might be interesting to better understand at what point in the day people first pick up a magazine and read it. This might be useful for example in optimally timing the time of day to place a banner ad on the Internet that is related to an advertisement in a magazine or advertising for a television show in a magazine to minimize the time between when they might read the advertisement and the time of day the show airs. As an empirical example, two survival variables were created for magazine readership – a time variable that noted the first hour in the day (starting at 6am) in which the respondent first read a magazine and a status variable that denoted if the respondent had read a magazine at all that day or not. If the respondent did not read a magazine that day then the event was

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considered censored.

Figure 10 illustrates the hazard function as generated by the Kaplan-Meier method for magazine readership across the 24 hour period, with the 0 point being 6am. The hazard function here represents the probability that the event will occur in that time period. Note that the slope of the hazard curve is modest until about time point 13 or 14 (between 7 and 8pm) where suddenly it takes on a much steeper slope suggesting the probability of reading in the next few hours has increased significant per unit time. It is easy enough to introduce factors in the Kaplan-Meier analysis as well and produce survival curves for males and females, high and low income segments, etc.

Figure 10

K-M Hazard Function Estimate
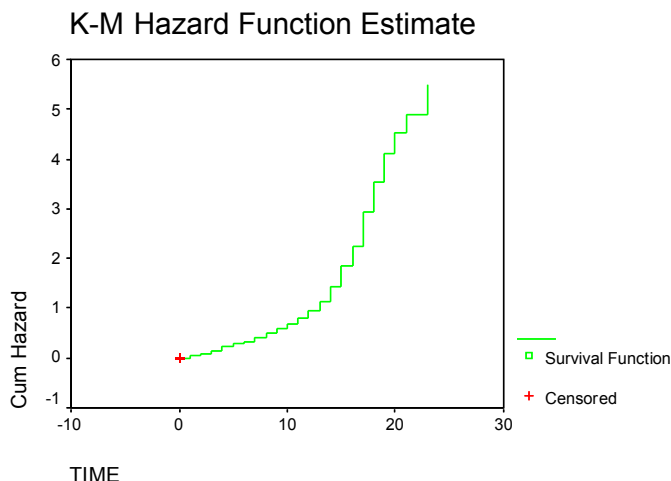
Survival Analysis – Cox Proportional Hazard Model
We can take the survival analysis a bit further by thinking about examining the relationship between the first point in the day at which a magazine is read and several of the demographic variables that we have examined in detail already. Utilizing a simple Cox regression for censored observations we can look at the simultaneous effects of gender, age, household income and education on the proportional hazard per time period. Because the time window for events is very short (e.g. 24 hours) we can consider changes in the covariates across time to be negligible. Table 3 reveals the results of the analysis. While it appears that household income has a statistically significant negative effect on the probability of reading a magazine during a specific time period that result should probably not be taken at face value given that the omnibus overall chi square statistic for the regression as a whole was 8.457 (p =.076) which suggests that as a set none of the variable in the Cox regression was significant.

Table 3 - Variables in the Cox Proportional Hazard Equation

	B	SE	Wald	df	Sig.	Exp(B)
SEX1	-.025	.059	.185	1	.667	.975
EDUC1	-.003	.011	.093	1	.760	.997
HHINC1	-.019	.008	4.960	1	.026	.981
AGE1	.009	.008	1.180	1	.277	1.009

These analysis strategies are just a small sample of the number of ways in which magazine and newspaper readership might be examined in the temporal realm. There are many more ways in which one might examine how time and magazine/newspaper readership might be interrelated.

Summary
This brief examination of temporal trends in magazine and newspaper readership has revealed common sense observations such as the high incidence of newspaper readership during the early morning hours as well as some less intuitive trends such as the large variation in magazine readership for the lowest income segment across much of the day It is hoped that this endeavor has sparked some additional interest in magazine and newspaper readership research area as well as in an area of that field that is normally less trodden then the traditional reach and frequency analyses environment.