# MAGAZINE MOBILE APP AUDIENCE ANALYSIS: PROTOTYPES FOR NEW DIRECTIONS

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### **Introduction**

The proliferation of mobile electronic devices in the last few years has greatly expanded consumers' media access choices. As with most major media, for print this important new distribution/consumption channel presents a variety of critical challenges and opportunities. Prominent among these challenges for print (and again for most other major media) is that of effectively monetizing their content on the mobile channel. For print media, the opportunity for distributing content electronically with a mobile device application (app) and thereby eliminating the costs associated with the production and distribution of paper-based content is enormously attractive. What remains as a challenge for print media companies is to be adequately compensated by advertisers and agencies for the audience their brands deliver to the latters' advertising through the mobile channel.

An important component of monetizing a print brand's content delivered through traditional printed/hardcopy, internet or the mobile channels is robust audience measurement – what are the size, composition and engagement of the print brand's audience as delivered to the average or specific issue and/or ad? This matter is particularly important for mobile insofar as many magazine companies see this channel as essential to their continuing prosperity.

Considered historically, the measurement of audiences for printed magazines has relied on one form or another of recall or recollection. While some work has been undertaken in pursuit of passive magazine audience measurement (e.g. RFID and related technologies) for a variety of technical and economic reasons little genuine progress has been made in this direction. This stands in distinct contrast to digital audience measurement wherein much is passive irrespective of whether it is site or server or panel based.

This fundamental distinction between recall/recollection and passive magazine audience measurement conventionally extends beyond the prima facie one of the information collection technique to the range and nature of the information collected. Typically passive methodologies collect an abundance of detailed data (often second-by-second and/or event-by-event) with respect to the media being measured and it is usually from these that the various audience estimates are derived (e.g. Live, Live+7 and C3 for television). In contrast, recall/recollection methodologies of necessity ascertain audience in a more monolithic fashion (e.g. "Have you read or looked into any issue of Magazine X in the last week/month?"), but typically supplement these audience metrics with a broad array of other media, consumer and psychographic ones. In fact, print is particularly advantaged among competing media as regards the varieties of different targets for which magazine vehicle audiences can be assessed.

Moreover, certain passive digital measurement methodologies offer virtually complete census-level coverage in contrast to the (typically high quality) sample-based approaches of recall/recollection. This is particularly important in the case of print app measurement wherein at this moment audience incidence levels are generally small and thus only imprecisely measured through sample-based schemes.

Hence the challenge for magazine mobile app measurement, how do you retain the advantages of each measurement methodology in a consolidated information and analysis source?

It is toward providing an answer to this question that the work at hand is primarily directed. We develop a means through which to integrate audience composition and targeting information from a traditional sample-based methodology with the granular event data from a server based census technology. Additionally, the approach herein outlined offers some potential beyond audience measurement and ratings to incorporate a predictive analytic strategy supportive of an enhanced advertising delivery model.

Thus, the two primary analytic foci of this paper are:

- 1) The integration of diverse audience targets with granular magazine mobile app data.
- 2) Predictive advertising exposure analytics.

## Integration of Targets with Magazine Mobile App Data

The integration of multiple media audience data sources has been undertaken for multiple decades in multiple countries and for multiple purposes. One direction this work has taken is the integration of audience (and other data) from ratings (and qualitative) data sources for different media, e.g. print/television, print/internet, television/internet, etc. Another direction involves the integration of separate data sources for a single media, e.g. meter/diary integration and sample/return-path data in television, hybrid (sample/server) data for the internet, etc. In a very fundamental way the work at hand bisects these two directions as it employs different data sources related to different channels (hardcopy/print and mobile app) but nevertheless associated with essentially the same media content. Nevertheless, this initiative is grounded on and draws strength from established integration approaches.

The integration undertaken in this work involves the imputation of demographic and consumer behavior measures from GfK MRI's Spring 2013 Survey of the American Consumer (SAC) with Adobe SiteCatalyst (SC) data for a single magazine's mobile app. Additionally, both issue reading frequency and mobile device measures from SAC are used as critical links. The granular magazine mobile app SC data is for a single Conde Nast weekly general interest publication for the time period March 1, 2013 through April 10, 2013 (eight weekly issues dated from 2/25/2013 to 4/10/2013).

As preliminaries two critical points are worth mention. First, it is not the ambition of this integration to develop an integrated/total hardcopy/mobile audience measure, but rather the more modest one of providing targeting (and other similar measures) information into otherwise highly detailed mobile app data for mobile magazine app audience analysis. Second, unlike much other audience measurement data, the SC mobile app data is owned neither by a research company (e.g. GfK MRI or Nielsen) nor the data collection service (e.g. Adobe), but rather is the property of the media company, in this case Conde Nast. The authors very much wish to acknowledge the substantial contribution Conde Nast has made to this endeavor. At the same time it is important to recognize that the development of a large-scale common database of multiple magazine app audiences along the lines developed herein for a single title would very much depend on the willingness of the mobile app data owners – in this case the individual media companies.

## **Frequency and Device Based Integration**

As noted previously in the discussion of sample and census based media measurement while these two data sources are rich in their respective measures there is little overlap with respect to these measures. This relative paucity of common measures upon which to found an integration forces the focus upon the most prominent common measures – frequency of reading and mobile device use. Broadly, the strategy employed categorizes the SAC measure(s) of interest (e.g. demographics, consumer behaviors, etc.) for the eReader/iPad universe by issue reading frequency by device type (Apple, Amazon and Other) for the publication as measured in the SAC, subsequently distributing the measure(s) of interest into the SC data by app issue reading frequency by device.

Table #1 offers greater detail for the SAC data (table is truncated for the purposes of display). Essentially each data cell contains the composition (expressed as a proportion) for each demographic or consumer measure for each issue frequency level (the columns) by mobile device (Apple, Amazon and eReader/Other) for the publication.

Table #1 – Composition by Issue Reading Frequency by Mobile Device (GfK MRI Spring 2013)

Apple	Freq-0/4	Freq-1/4	Freq-2/4	Freq-3/4	Freq-4/4
Con_FinancialService1	0.0284	0.0483	0.0222	0.1102	0.0642
Con_FinancialService2	0.0626	0.0756	0.0508	0.0472	0.0902
Con_CredCard1	0.1949	0.2659	0.3095	0.1890	0.3101
Con_CredCard2	0.0754	0.1443	0.2159	0.0866	0.1667
Con_OwnAutoBrand1	0.0398	0.0262	0.0238	0.0000	0.0437
Con_OwnAutoBrand2	0.0498	0.0285	0.0048	0.0236	0.0123
Con_ForeignTravel	0.4054	0.4974	0.3365	0.4409	0.5410
Sex_Male	0.2959	0.4840	0.4000	0.4961	0.3784
Sex_Female	0.7041	0.5160	0.6016	0.5039	0.6216
Age_18to34	0.4395	0.3002	0.2984	0.2126	0.2117
Age_35to54	0.4339	0.4793	0.3667	0.5827	0.4153
Age_55to100	0.1266	0.2205	0.3349	0.2047	0.3716
HHI_0to74	0.1991	0.2664	0.2825	0.3307	0.1749
HHI_75to99	0.1892	0.1489	0.0714	0.2520	0.2541
HHI_100to149	0.2674	0.1704	0.2571	0.2126	0.2008
HHI_150to1000	0.3457	0.4142	0.3889	0.2047	0.3702
Educ_CollGrad	0.6486	0.7173	0.6937	0.7244	0.8989
Educ_SomeColl	0.3087	0.2094	0.2016	0.2283	0.0833
Educ_HSGrad	0.0341	0.0733	0.0714	0.0551	0.0001
Educ_LTHS	0.0100	0.0001	0.0333	0.0001	0.0191
Amazon	Freq-0/4	Freq-1/4	Freq-2/4	Freq-3/4	Freq-4/4
Con_FinancialService1	0.0230	0.0575	0.0552	0.0483	0.0543
Con_FinancialService2	0.0461	0.0789	0.0531	0.0690	0.1174
Con_CredCard1	0.2056	0.3208	0.3100	0.2069	0.3435
Con_CredCard2	0.1349	0.1775	0.1444	0.0621	0.1543
Con_OwnAutoBrand1	0.0477	0.0172	0.0870	0.0000	0.0652
Con_OwnAutoBrand2	0.0789	0.0395	0.0786	0.0690	0.0087
Con_ForeignTravel	0.2829	0.4322	0.3885	0.2414	0.6457
Sex_Male	0.4753	0.4160	0.4140	0.2345	0.4348
Sex_Female	0.5247	0.5840	0.5860	0.7655	0.5652
Age_18to34	0.4539	0.1750	0.2059	0.3793	0.0957

Chart #1 provides detail for the SC data for the corresponding magazine app. Each column is based on the pool of the mobile magazine app's users for which the specified issue number was their first (e.g. First-1=2/25/2013, First-8=4/10/2013). As the time frame from which this mobile app frequency data derives is both left (prior to March 1, 2013) and right (after April 10, 2013) censored a true frequency distribution is not possible for all magazine app users. Nevertheless, this incomplete data serves as a fairly good measure of the majority of all mobile app users' frequencies with the earlier (left-most) distributions informing what the right censored later distributions will develop into.

## Chart #1 – Mobile App Magazine Issue Frequency



## Conde Nast Weekly - Issue Frequency by First Occurence

With this frequency-based foundation in place the process of integrating SAC data (demographics, consumer behaviors, etc.) devolves into simply assigning the proportion/probability from the SAC data onto the SC data based upon common frequency and device. For example, SC magazine app visitors for whom the first issue read was 2/25/2013 (First-1) and who had a frequency of 7 or 8 (Freq-7, Freq-8) were assigned a probability of being Male of 0.3784 and Female of 0.6216 if they used an Apple device– the probabilities from the most analogous frequency level (Freq 4/4) for SAC for Apple.

Chart #2 illustrates the magazine app composition for four central demographic measures (Sex, Age, Household Income and Education) derived using this frequency based integration approach. As the preponderance of the magazine app visitors have relatively high frequencies the integrated demographic profiles most resemble the higher frequency SAC cohorts. Chart #3 shows the magazine app composition but this time for a consumer target – having an account at a particular financial services firm.

Clearly the burden of this integration technique falls on the representativeness and discriminating power of reading frequency in general and in the case at hand the SAC and SC based frequencies. A number of important questions arise reflecting this burden. Two among them are:

- 1) To what extent is frequency of reading discriminating with respect to the measures being integrated from SAC into SC?
- 2) As the SAC frequency is based on primarily hardcopy reading of the magazine, albeit for universes having the particular mobile device, how representative is the SAC frequency data of the magazine's mobile app composition?

To address the first of these questions, while frequency by mobile device is a single measure with two dimensions, given the conventions and history of print audience research it must be considered a fairly strong one. Frequency is regularly the single or an important allied average issue audience measure, is fundamental to reach/frequency estimation and often a surrogate or component of engagement and involvement among other magazine audience qualitative factors. Hence, given frequency's centrality to print audience measurement with validation lying in decades of print audience research there is a strong prima facie case that it is robust for use in this context.

Moreover, this integration is not focused on establishing a total population incidence from a sample, as SC data is a fairly robust measure of the total incidence of magazine app usage. Rather the ambition of the integration is the more modest one of providing composition (demographic, consumer, etc. from SAC) to a relatively complete cohort of magazine app users (SC). Finally, while of necessity in this initial exercise we have used this frequency measure it is altogether possible that at some future moment additional and/or enhanced measures could be developed and employed, e.g. from "pop-up" questions delivered to magazine app users.

The second question is in some sense the deeper and more interesting one: to what extent are the SAC and SC frequencies comparable and thus sound for the purposes of this integration?

One potentially strong objection to this strategy is that SC is a machine/device measure not a person-based one (as is SAC) and hence this approach imputes person-level characteristics onto what are really machine incidences. This claim is certainly true – SC data is essentially a machine/device measure – however much current research confirms that there is very limited sharing of mobile devices even within multi-person households. Hence the relationship between SC machine/device measures and persons is very direct (almost 1-to-1) and person-based projections and analyses consequently credible in this regard.

The more serious and stronger consideration concerns the fact that the SAC frequency information is primarily based on reading of the hardcopy version, albeit among different cohorts of mobile device owners, not reading of the magazine app on these devices. (Given the very small incidence of magazine mobile app reading at this point in time, sample-based measurement is compromised by very small sample size.)

While a complete resolution to this question is not possible for the afore mentioned reasons consider the following thought experiment:

- 1) Assuming the readers of the magazine's mobile app were completely typical of the mobile device universe what would their composition resemble?
- 2) If the composition for the mobile app readers was different from the mobile universe in what ways would you expect it to be?

Tablets & E-Readers Total	Total	Freq0	Freq1	Freq2	Freq3	Freq4
Men	43%	40%	46%	40%	40%	41%
Women	57%	60%	54%	60%	60%	59%
Age 18-34	34%	43%	25%	30%	30%	20%
Age 35-54	43%	40%	44%	35%	37%	36%
Age 55+	24%	18%	31%	35%	33%	44%
ННІ 0-74	40%	33%	33%	32%	31%	24%
ННІ 75-99	16%	21%	16%	10%	18%	21%
HHI 100-149	23%	21%	20%	27%	13%	21%
HHI 150+	21%	25%	31%	31%	38%	34%
Educ: graduated college plus	47%	60%	69%	59%	72%	88%
Educ: attended college	31%	32%	21%	28%	25%	11%
Educ: graduated high school	18%	3%	11%	7%	2%	0%
Educ: did not graduate HS	4%	5%	0%	7%	0%	1%
	Correl	0.9186	0.8815	0.8882	0.8414	0.7089

 Table #2 – Total Mobile Device and Magazine App Reader Composition

In answer to the first question, if the magazine mobile app readers looked exactly like the total device universe the expectation would of necessity be that their composition would be the same. Table #2 contains the composition percentages for the mobile device universe as measured in the GfK MRI Spring 2013 SAC. The Total column contains the total mobile device universe composition percentages and the Freq0 through Freq4 columns the composition percentages for the magazine (primarily hardcopy) by frequency. The correlations between the mobile universe composition percentages and the individual frequency groups are in the bottom row. The correlations are fairly strong overall, so one can say that generally there is a resemblance between the two groups. Now let's consider the second question, in what ways do these two groups differ? As background, the demographic skew of this Conde Nast title's total audience is towards higher household income, higher education and older. Hence, the expectation would be that the greatest dissimilarity between the magazine app's readers and the total mobile universe would occur among the magazine app's core readers – the higher frequency groups. This is exactly what is found – the light/non-core readers look more like the general mobile device universe (0.92 correlation) than do the heavy/core-readers (0.71 correlation). Moreover, most of the difference between the high frequency groups and the total mobile device universe are in exactly the demographics where this magazine skews higher – income, education and age.

While the object of study for this analysis is a single magazine app, analyses undertaken by Nielsen using their iPad and Smartphone panels offer a broader perspective. These panels employ on-device metering to deliver electronic measurement of iPad and smartphones including apps and websites.

For the approximately 1,000 person iPad Panel users of print media (newspaper and several large magazines) related app's are older, wealthier and more highly educated than the average iPad user. Among Nielsen's larger Smartphone Panel (approximately 5,000 persons) users of readership app's (newspapers) also are older and wealthier. Again, while not definitive, these findings from Nielsen's panels are largely consistent with the SAC-based findings.

		Use			
		Readership	iPad Panel		
iPad Unweighted Panel Profiles		Apps	Profile	Difference	Index
Gender	Male	54	38	16	141
	Female	46	62	-16	75
Age	18-34	25	36	-11	69
	35-54	48	49	-1	97
	55+	28	15	13	185
Income	<\$50K	26	36	-11	70
	\$50K - \$100K	37	40	-3	93
	>\$100K	38	24	14	158
Employer Pays Connection Bill	Yes	12	8	4	154
Postgraduate Degree	Yes	19	14	5	133
Working	Full Time Employed	49	45	4	108
	Retired	11	5	7	245

## Table #3 iPad Readership App Profiles – May 2013 (base = 1058 respondents)

Note: the overall gender profile of the iPad panel shows a skew towards females. This appears to be a combination of real skew in usage/ownership of iPads (the MRI study shows 53:47 female/male ratio) and panel recruitment bias.

		Use			
		Readership	Smartphone		
Smartphone Profiles		Apps	Panel Profile	Difference	Index
Gender	Male	59	49	9	119
	Female	41	51	-9	82
Age	18-34	25	38	-13	65
	35-54	45	38	7	119
	55+	30	23	6	127
Income	<\$50K	21	37	-15	58
	\$50K - \$100K	38	34	4	111
	>\$100K	41	29	12	140

### Table #4: Smartphone Readership App User profiles - May 2013 (base = 5071 respondents)

So while we do not have available the true composition for the frequency groups for the magazine's mobile app readers the frequency distribution we are using conforms to reasonable expectations.

## Mobile App Usage - A Multiplicity of Metrics

Charts #2 and #3 begin to suggest the value of this integration – the application of composition metrics from SAC to SC magazine app visitor levels. But they hardly exhaust the analytic capabilities of combining audience composition data (SAC) with granular event and time magazine app usage data (SC). Charts #4 and #5 show the audience accumulation for individual issues and for all issues (Total) across the 3/1/2013-4/10/2013 period for total and the consumer financial services target respectively. (Note also that the color of the line indicates the average issue frequency – "redder" is higher.) These accumulation distributions strongly resemble those for the hardcopy version of this magazine app title, suggesting that while the reading channels (app versus hardcopy) are clearly distinct that certain fundamental characteristics of the reading behavior remain relatively consistent.

18 to 34

35 to 54 55 or Older

## Chart #2 – Demographic Composition of Magazine App Visitors



GfK MRI Adjusted Adobe SiteCatalyst Magazine App Audience - HHI



GfK MRI Adjusted Adobe SiteCatalyst Magazine App Audience - Education







Chart #4 - Total and Individual Issue Audience Accumulation - Total Magazine App Visitors





#### Chart #5 - Total and Individual Issue Audience Accumulation - Financial Services Product Magazine App Visitors

While somewhat chaotic in its static form, Chart #6 shows day-by-day for each of the issues and total the daily (vertical axis) and cumulative (horizontal axis) magazine app audience along with average frequency (color of line and circle) and time spent (size of circle) for the financial services target. (The interactive application from which these graphs are taken will be more completely displayed during the PDRF 2013 presentation.) The integration of the granular SC data with the targeting data from SAC affords the sorts of detailed diachronic analysis heretofore available only for television and in certain limited cases radio. Perhaps the most prominent feature of the data displayed in Charts #6 through #8 is the marked periodicity associated with the release, download and reading/perusal of each new issue. While Chart #6 displays Daily (vertical axis) and Cum (horizontal axis) Unique Visitors virtually all daily metrics related to time spent, amount of editorial and ad pages consumed, etc. exhibit this pattern – predominant consumption on the first issue day followed by the release of the next issue and a dramatic rise in overall magazine app visitors and use.

Charts #7 and #8 also show an interesting feature of magazine app usage – visitation and related measures (e.g. Visitors, Time Spent, Advertising and Editorial Content Viewing) – highest on the first issue day, declining levels from days 2 through 4 and then an upward trend on the fifth and sixth days. Chart #8 – time series autocorrelation sub-charts of four magazine app reading metrics – clearly shows this consistent pattern.



Chart #6 - Daily and Cumulative Magazine App Audience - Financial Services Product Magazine App Visitors

Chart #7 – Daily Unique Visitors – Total Magazine App





## Chart #8 – Autocorrelation of Daily Visitors, Time Spent, Editorial and Advertising Views

Finally, Charts #9 and #10 take the analysis from the magazine app issue to the individual advertising and editorial content levels respectively again using the financial service target. As would be expected from the overall magazine app usage pattern (Charts #6, #7 and #8) the patterns of advertising and editorial consumption exhibit the heaviest consumption on the first issue day with substantially lower rates for subsequent days.

While the variety of metrics possible with this sort of integrated database is essentially unlimited the limited set of analyses undertaken here suggests the range of potential for this approach.



Chart #9 - Financial Services Related Ads for Financial Service Target





### Predictive Advertising Exposure Analytics

The preponderance of internet advertising buying/selling is driven through ad serving services employing sophisticated model-based trading algorithms. Broadly stated these algorithms use combinations of historic and real-time traffic data, advertising objectives (e.g. reach, frequency, flighting, click-through rates, etc.) and pricing information among other factors to optimize the placement of advertising on sites.

Internet sites/content providers, with magazine media sites among them, have not uniformly benefited from this online advertising trading model. The sales efficiencies afforded by large exchanges are often offset by the loss of pricing leverage derived from premium content. Magazines have often found themselves trading dollars of hardcopy advertising sales revenue for pennies (at best) of comparable internet revenue.

The emergence of apps is seen by many magazines as a return to the more attractive sales model of hardcopy – revenue from both app subscriptions and advertising at better than commodity pricing given the premium character of the content not to mention potentially lower production and distribution costs – all the while offering the reader portability, accessibility and interactivity. Nevertheless, a number of challenges remain for magazines in realizing this more favorable transaction model. Prominent among the challenges magazines face is that many advertisers and their agencies are skeptical of whether or not app advertising offers effectiveness comparable to hardcopy and are thus reluctant to pay comparable rates.

Hence this concluding section is directed toward understanding app advertising consumption behavior to begin to address the larger question of app advertising efficacy and to do so using the sorts of tools employed in algorithmic ad trading.

To address these matters we begin by posing the following set of questions:

- 1) What portion of magazine app readers see the ad?
- 2) How long does it take (or how many interceding events occur) until a magazine app reader sees the ad?
- 3) How long do they view the ad?
- 4) Are these behaviors different for the ad's target versus non-target audiences?

To begin to answer these questions we employ survival/event history analysis (SEHA), a tool central to much algorithmic internet ad trading. "Survival and event history analysis is an umbrella term for a collection of statistical methods that focus on questions related to timing and duration until the occurrence of an event." [Mills, 1] In particular, SEHA is useful in addressing questions of proportion over time (e.g., "What proportion of magazine app readers come to view a particular ad and over what duration?") and the particular technique employed herein, Cox Proportional-Hazards Regression (CoxPH), allows for the control of confounding variables and thus informs questions related to the composition of the ad viewer.

As the following case analyses will reveal, CoxPH models the portion of a magazine app's readers who view the ad (Question #1) and over what period (Question #2). Moreover, by setting differential time thresholds for the viewing of the ad a sense of viewing duration is offered (Question #3). Finally by stratifying the CoxPH model by target/non-target app readers and controlling for other characteristics (e.g. demography), a sense of app ad audience composition by exposure (Question #4) is revealed.

To begin to understand how magazine app readers come to view the magazine app ad consider two financial services related advertisements from the March 18<sup>th</sup>, 2013 issue of the Conde Nast weekly evaluated in the prior section. Second, and analogous to what hardcopy magazine advertising planners would undertake, we selected a financial services related target; in this case having an account at a large multi-service brokerage and mutual fund firm. This target along with a variety of major demographics (Sex, Age, and HHI) were integrated using the techniques previously reviewed and used as controls in the CoxPH regression. For efficiency of execution a 10% random sample of the issue's app users was selected. Chart #11 shows the results of the CoxPH for both the target (solid dot line) and the non-target (X-box line). The horizontal line is the number of days from the release of the issue through the app until the viewing of the two advertisements and the vertical the proportion of the app visitors viewing the respective ads.

0.0

0

5

10





Calendar Days to AD: Tame your taxes. (2)

Over the 30+ day period approximately 40+% of the magazine app issue readers came to view the ads (defined as spending 2 or more seconds on the ad pages in the SC data) with 1) the viewing being fairly evenly distributed over the interval and 2) with the target audience viewing at considerably higher levels in the early interval. In short, the target audience is getting to the ads earlier and for "Tame your taxes" to a slightly higher overall level.

15

Calendar Days

20

25

30

#### Chart #12 - Peru Adventure Ad for Foreign Travel Target



Calendar Days to AD: Explore the Peruvian Amazon, a lasting experience. (1)



Calendar Days to AD: Explore the Peruvian Amazon, a lasting experience. (2)



Chart #12 portrays the results of another CoxPH analysis this time for "Explore the Peruvian Amazon..." against a GfK MRI target of 1 or More Foreign Trips in the Last 3 Years. In this example, the three individual graphs all show that the target views the ad at higher levels overall throughout the entire 30+ day period. The individual graphs are for three different threshold times for what counts as viewing the ad – one, two and five seconds. While the proportion declines as expected from one to five seconds the target consistently is exposed at higher levels relative to the non-target along the entire duration.

The final case concerns a Dolce & Gabbana perfume ad. Like the prior two cases the target (18 to 34 Year Old Females) views the ad at a (slightly) higher overall proportion than the non-target group, but unlike these other two cases target group exposure actually lags slightly the non-target group proportion in the first five or six days. The probable cause of this difference lies at least in part with the location of the ad – on the inside front cover or Page #1 as characterized by SC. Thus, virtually everyone who opens the issue app has at least some non-trivial chance of viewing the ad and with this analysis if they view for approximately two or more seconds they are counted as ad viewers.





## **Conclusions and Future Developments**

As these investigations are more prototypical than refined their value lies as much in the sorts of future work they suggest as in what they conclusively offer at the moment.

With respect to future development two different directions suggest themselves. First is the obvious one of refining the integration method (if possible) and the ad modeling and analysis. The second direction involves the more thorough operationalization of these sorts of predictive analytics into the magazine app ad buying/selling and delivery processes.

Regarding the first of these directions the data and models reviewed herein have been of necessity limited. As noted in an earlier section the use of issue reading frequency as the fundamental integration variable is reasonable as far as it goes, but a more extended set of measures would almost assuredly be useful. In fact some, such as reading occasions and time spent reading, already collected in sample-based methodologies (e.g. SAC, NRS, etc.) may extend the eloquence of frequency (by device) alone and hence strengthen the discriminating power of the rich sample-based metrics in the integrated data source. The second sort of data enhancement would be the incorporation of editorial content and page location information as independent variables into the ad exposure modeling process. As was evident in the final case (Dolce & Gabbana perfume) appearing on the inside front cover matters and one can easily imagine that numerous other location-related variables (both page-related and in relation to other ads and editorial) matter also. In fact, Survival/Event History Analysis invites the incorporation of time-dependent covariates and the SC data is uniquely rich in such measures. Similarly, these analyses can be extended to include frailty analysis to assess repeat exposure. The granular SC data affords abundant opportunity for this

sort of investigation and model enhancement and was included in only a very limited scale in this initial work due to the exigencies of deadlines – "Were there world enough and time..."

A second direction for future work lies in the more thorough operationalization of these data and models into the ad buying/selling and delivery processes. The vast majority of internet advertising is placed programmatically using techniques including those employed in this project – e.g. Time Series Analysis and Survival/Event History Analysis. (The authors clearly recognize that commercial internet ad services and similar entities employ models and databases of vastly greater proportion and sophistication than those used for this project. Nevertheless, the point is simply that the models are generally based on similar underlying pools of theory and/or are directed toward similar ends.) As noted previously, while programmatic ad placement offers enormous market and operational efficiencies it has also generally commoditized the internet ad market and not always to the benefit of magazine brands' (and others') internet businesses. The ability of magazine (and other) app developers to dynamically deliver advertising (e.g., placement, content, etc.) using robust targeting models holds some potential for differentiation and hence pricing leverage. Magazines have enjoyed the advantage of precise demographic, behavioral and psychographic targeting in hardcopy advertising sales. The sort of direction – target integration combined with predictive modeling and analysis techniques - articulated herein potentially extends this advantage for the magazine brand into mobile channel all the while offering the efficient, dynamic, information driven delivery of advertising through their app.

#### Endnotes:

1. Mills, Melinda (2011), Introducing Survival and Event History Analysis, London: Sage Publications.