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EVALUATING MEASURES OF CAMPAIGN ADVERTISING EXPOSURE ON POLITICAL LEARNING

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Scholars employ various methods to measure exposure to televised political advertising but often arrive at conflicting conclusions about its impact on the thoughts and actions of citizens. We attempt to clarify one of these debates while validating a parsimonious measure of political advertising exposure. To do so, we assess the predictive power of six different measurement approaches—from the simple to the complex—on learning about political candidates. Two datasets are used in this inquiry: (1) geo-coded political advertising time-buy data, and (2) a national panel study concerning patterns of media consumption and levels of political knowledge. We conclude that many traditional methods of assessing exposure are flawed. Fortunately, there is a relatively simple measure that predicts knowledge about information featured in ads. This measure involves combining a tally of the volume of advertisements aired in a market with a small number of survey questions about the television viewing habits of geo-coded respondents.

Key words: political advertising; advertising exposure; political learning.

Some of the most important questions in the study of political advertising hinge on correctly measuring citizens' exposure to campaign messages. How

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does the tone of advertising affect voter turnout? Does negative advertising produce a backlash effect? Can exposure to political advertising increase voter learning about candidates? To answer these questions, scholars have employed a variety of methods for gauging advertising exposure, from self-assessments of campaign contact to imputations based on media consumption patterns and ad scheduling. Yet the validity of each approach, and the corresponding conclusions about campaign advertising, remains in question because there have been few, if any, attempts to assess these measures relative to one another.

This has not stopped politicians, pundits, and the public from becoming increasingly critical of the volume of political advertising, especially televised political attacks. In part, these concerns are grounded in the assertion that negative political advertising demobilizes the electorate (Ansolabehere and Iyengar, 1995). Yet even if a campaign attack lowers turnout for some citizens, "it is likely to stimulate others by increasing their store of political information" (Finkel and Geer, 1998, p. 573). As this suggests, the informational effects of political advertising on political knowledge may encourage campaign involvement and political engagement (Delli Carpini and Keeter, 1996; Goldstein and Freedman, 2002a).

Indeed, research examining the content of campaign ads and their effects on the public suggests that candidate commercials may provide positive benefits. Scholars report that most of these ads address relevant campaign issues and provide information often unavailable in traditional news sources (Kaid and Holtz-Bacha, 1995; McClure and Patterson, 1974). However, since Patterson and McClure (1976) first lauded the potential of political ads to inform the citizenry, the evidence in support of their assertion has been less than consistent. Several studies found that attention to political ads was not a significant predictor of issue or candidate knowledge in certain contexts (Chaffee et al., 1994, Weaver and Drew, 1995). Yet other studies find that certain classes of voters learn a considerable amount of information about candidates and their positions on issues from ads, sometimes rivaling the effects of television news (Atkin and Heald, 1976; Zhao and Bleske, 1995; Zhao and Chaffee, 1995).

In this paper, we evaluate six different methods of measuring exposure to advertising by examining how well each predicts political knowledge. They range from the simple—one survey question asking respondents how many hours a day they watch television—to the extremely complex—a measure that combines respondent answers to over 25 survey questions with advertising tracking data from the country's 75 largest media markets. In the end, we find that many traditional measure of exposure do not do the trick, but that a relatively simple procedure involving the use of no more than six survey questions in combination with contextual advertising data provides a quality measure of exposure. In the process of validating this measure, we also clarify

the debate surrounding the relationship between exposure to political advertising and political knowledge about candidate policy positions and personal traits.

MEASURING ADVERTISING EXPOSURE

Past attempts to measure exposure to televised political advertising have fallen into two broad categories: those that rely upon people's recall and those that attempt to measure the volume of messages sent. The most basic approach in the first category is asking survey respondents how much attention they have paid to political ads on television. For instance, Zhao and Chaffee (1995) employed the following question wording in a study of the 1988 presidential campaign: "For each of the following, indicate how much attention you have given to it on television: Commercials for Bush, Commercials for Dukakis." Respondents were asked to give an answer ranging from 0 ("no attention") to 3 ("very much attention"). In a parallel survey, they asked: "How much attention, if any, have you paid to the campaign commercials on television during the presidential campaign: a lot, some, very little, or none?"

Sides (2001), in an analysis of the 1998 California gubernatorial race, took a similar approach, asking: "Have you seen or heard any ads in TV, radio or newspapers for the governor's race?" If the respondent answered affirmatively, a follow-up was asked: "Have you heard or seen a great deal, some or just a few ads?" West's (1994) study of U.S. Senate campaigns changed the focus slightly, asking those surveyed how many days in the past week they recalled seeing ads for a particular candidate. These approaches rely on the ability of respondents to recall whether they have seen commercials or gauge how much attention they paid to the commercials that they saw. Given the fleeting nature of all commercial communication, this is a big assumption that is fraught with potential reliability and validity problems.

Responding to some of the limitations of this abstract retrospective approach, another method asked respondents to recall specific commercials that they had seen (Brians and Wattenberg, 1996; Wattenberg and Brians, 1999). The 1992 National Election Studies used this approach and followed this question with another in which respondents were asked to report what they recalled about these advertisements. Respondents were prodded to give up to five responses. Although this method has the advantage of focusing on recall of specific advertisements as opposed to reflection on past levels of exposure and attention, it still assumes that individuals can accurately recall exposure to brief campaign messages. Of course, advertising exposure is the least conscious aspect of television viewing, a fact that begs the accuracy of unaided recall assessments (Thorson, 1983). Due to these weaknesses, others have conceptualized alternate approaches for assessing the volume of political advertising exposure.

Opting for an approach that emphasized the volume of television exposure, Patterson and McClure (1976) used the amount of respondents' television viewing as a proxy for exposure to television advertising. Respondents were asked to complete a form in which they indicated how many times in the past four weeks they watched a large number of prime-time television programs. People who watched an hour or less of television on an average evening were classified as low exposure, and those watching more were classified as high exposure. Obviously, this measure also suffers from limitations, mainly the crudeness of the instrument used to gauge ad exposure and the lack of attention to actual ad placement.

This approach also fails to directly measure differences in the volume of political advertising within the information environment, which can vary considerably across states and media markets. With this in mind, Hagen, et al. (2002) used counts of advertisements in each media market as a predictor of individual vote choice between Bush and Gore in 2000. Although this method recognized that the opportunity for an individual to be exposed to a campaign ad varied geographically, it did not account for the great range in the opportunity and motivation that individuals had to be exposed within a given market.

Seeking to bridge the divide between the recall and ad volume approaches, Goldstein and Freedman created two different measures of individual-level ad exposure. Both consist of combining measures of spots aired on television with measures of individuals' propensity to watch the television programs during which the spots were aired. First, Freedman and Goldstein (1999) measured this propensity through respondents' reports of when (in the early morning, during the late evening, etc.) they watched television. Next, they assessed this propensity through respondents' self-reports of the individual television programs they watched (Goldstein and Freedman, 2002a).

The Goldstein and Freedman approaches to measuring exposure to advertising are the most complex, but in the end, are the self-reports of television viewing that they rely on valid? How do these approaches compare with other volume-based approaches in terms of their predictive power? Is it worth the time and expense of adding additional questions to one's survey instrument or might a single question fare just as well or even better? The study outlined below attempts to address these issues by comparing the performance of various volume-based approaches to predicting citizen knowledge about the 2000 presidential candidates.

DATA

Survey Data

To address the validity of the various measures of exposure, this study relies on national survey data collected in February 1999, June 2000, November

2000, and July 2001 from a single panel of respondents. The February 1999 baseline data were collected as part of an annual mail survey—the "Life Style Study"—conducted by Market Facts on behalf of DDB-Chicago. Subsequent waves were collected as part of a research collaborative of faculty from the University of Wisconsin, Ohio State University, and University of Michigan (see Eveland, et al., 2003).

Notably, the Life Style Study uses a complex stratified quota sampling technique to recruit respondents. Initially, the names and addresses of millions of Americans were acquired from commercial list brokers. Via mail, large subsets of these people were asked to indicate whether they would be willing to participate periodically in surveys for small incentives and prizes. Given the likelihood that "the few people who choose to participate might differ significantly from the many who do not, this sampling procedure requires that we consider the serious possibility of response bias in these data" (Putnam, 2000, p. 421). Indeed, the rate of acceptance of the invitations to participate ranges from "less than 1% among racial minorities and inner-city residents to perhaps 5–10 among middle-aged, middle-class 'middle Americans'" (Putnam, 2000, p. 421). It is from this pre-recruited "mail panel" of roughly 500,000 people that a stratified quota sample was randomly drawn for inclusion in the annual Life Style Study. That is, the sample was selected to reflect the demographic distribution of the population within the nine Census divisions in terms of household income, population density, age, and household size. Further, the starting sample of mail panelists was adjusted within the subcategories of race, gender, and marital status to compensate for expected differences in return rates. Of the initial sample of 5000 people, 3388 responses were received for a response rate of 67.8% against the February 1999 mail out.[1]

For the June 2000 wave of the study (hereafter labeled "Wave 2"), Market Facts re-contacted the individuals who completed the February 1999 survey. To ensure a high response rate—and a more representative sample—an incentive of a small tote bag was offered for completing the survey. The attrition rate for this survey against the previous wave for this survey was 43.9%, with 1902 respondents completing the questionnaire. For the November 2000 wave of the study (hereafter labeled "Wave 3"), Wave 2 respondents were re-contacted. The attrition rate against the previous wave for this survey was 30.9%, with 1315 respondents completing the questionnaire. Finally, for the July 2001 wave of the study (hereafter labeled "Wave 4"), Wave 3 respondents were re-contacted. The attrition rate against the previous wave for this survey was 26.2%, with 971 respondents completing the Wave 4 questionnaire.

These non-probability sample panel data have been validated against concurrent probability sample panel data, the American National Election Study (Eveland et al., 2003). Comparisons of the second wave of the ANES to the June data collection, found few, if any, demographic differences in terms of

age, sex, education, and income. Given the high response rate to Waves 3 and 4 of our panel study, there is no reason to believe that our data would be any different from a subsequent waves of the ANES, had ANES conducted additional waves. Nonetheless, panel attrition may cause some skews to be introduced in the data in later waves.

Political Advertising Data

To gauge what was aired, we obtained advertising tracking data from the Wisconsin Advertising Project at the University of Wisconsin. The Wisconsin project takes in and codes data collected by the Campaign Media Analysis Group (CMAG), a commercial firm that specializes in providing real-time tracking information to campaigns. The CMAG campaign advertising data represent the most comprehensive and systematic collection of political advertisements ever assembled. CMAG, using a satellite tracking system, collects the larger set of broadcast data. The company has "Ad Detectors" in each of the 100 largest media markets in the U.S.[2] The system's software recognizes the electronic seams between programming and advertising and identifies the "digital fingerprints" of specific advertisements. When the system does not recognize the fingerprints of a particular spot, the advertisement is captured and downloaded. Thereafter, the system automatically recognizes and logs that particular commercial wherever and whenever it airs.

In the final dataset, each case represents the airing of one ad. Each case also contains information about the date and time of the ad's airing, the television station and program on which it was broadcast, as well the coding of its content. These data can then be aggregated to the level of the unique ad, and can be aggregated on market, ad type or some other variable.

SIX MEASURES OF ADVERTISING EXPOSURE

In this paper, we have created six measures of exposure to political advertising. They range from the simple—one question about the frequency of television viewing—to the complex—an index constructed from 26 survey questions. Appendix 1 contains the complete question wording for all measures. The six measures are:

1. Hours of television viewing: This is the simplest recall measure, just the number of hours a day the respondent reports watching television.

2. Total Ads: This is the total number of presidential spots aired in the respondent's media market. This includes spots sponsored by candidates, parties and interest groups.

3. Hours of Television Viewing Multiplied by Total Ads: This is the number of hours per day the respondent watches television multiplied by the total number of ads aired in his or her media market. The logic of this measure is

that both television viewing and the airing of ads are necessary conditions for exposure. No matter how much television people watch, they cannot be exposed if there are no presidential ads aired in their markets. Likewise, a market flooded with advertising does not lead to exposure if the individual does not watch television.

4. Five-program Measure: This measure is based on respondent viewing habits of five different television program types: local news programs, morning news programs, game shows, soap operas and daytime talk shows. We chose to focus on these five types of programming because the bulk of campaign ads air during these programs (Goldstein and Freedman, 2002b). The measure is a simple dichotomous indicator of whether the individual watches the show. Each measure was multiplied by the number of ads aired in the respondent's media market during shows of that type. Morning news programs included Today, Good Morning America and the Early Show. Game shows included Wheel of Fortune, Jeopardy, Hollywood Squares, The Price is Right and Family Feud. Included soap operas were Guiding Light, As the World Turns, Young and the Restless, All My Children, One Life to Live, Days of Our Lives, General Hospital, Passions and the Bold and the Beautiful. Daytime talk shows were Oprah, Live with Regis, Motel Williams, Sally, Maury, The View, Dr. Laura and Jenny Jones.

To account for the fact that multiple television stations in each market air news broadcasts at the same time, the number of ads aired during local news programs was divided by three since viewers can watch only one channel at a time. We did the same for the morning news programs. We multiplied the number of presidential ads airing on other programs not included here by a measure of general television viewing (hours per day). The scores were then summed. It required six survey questions to create this index.

5. Daypart Measure: This measure is based on respondent reports of when they watched television. Respondents indicated whether they watched television during each of 10 time periods, and we assigned each period to specific hours of the day. The periods were shortly after waking up/before breakfast (6–8 a.m.), during breakfast (8–9 a.m.), mid to late morning (9-noon), during lunch (12–1 p.m.), early to mid afternoon (1–3 p.m.), late afternoon (3–5 p.m.), before dinner (5–6 p.m.), during dinner (6–7 p.m.), after dinner/mid to late evening (7–10 p.m.), and in bed/just before going to sleep (10-midnight). The number of presidential ads airing in the respondent's media market during each time period was multiplied by viewing habits in each time period, and all were summed. Ten survey questions were required to create this index.

6. Genre-based measure: This measure was created from a series of 25 questions that asked respondents how often (0 to 7 days a week) they watched television programs in various genres, including movies, family-oriented dramas, sports programs and situation comedies. Two graduate-student coders placed each television program in the CMAG data into one of these 25 genres,

an "other" category, or "don't know." The total number of presidential spots aired during each genre, as indicated by the CMAG data, was then multiplied by the number of days per week each individual watched each genre, and these scores were then summed. Ads airing during programs falling into the "other" or "don't know" genres were multiplied by a measure of how many hours per day the individual watches television and then added to the summary measure. It took 26 survey questions to create the genre-based measure of advertising exposure.

We took the natural log of all six measures in keeping with the theory that large increases in exposure to advertising should have diminishing marginal returns on knowledge.[3] Table 1 provides summary statistics for each of the exposure measures. Table 2 gives the correlations among the six exposure measures.

Particularly notable are the high correlations among the genre, five-program and daypart measures. One reason for this is the large number of people who had 0 presidential ads aired in their markets; thus they receive a value of 0 on all three of the exposure measures. The scatterplot matrix (Fig 1), however, shows that there is more variation than the correlation coefficients might indicate. Although the Genre, Five-Program and Daypart measures are quite

TABLE 1. Summary Statistics for Exposure Measures

	Mean	S D.	Minimum	Maximum
TV hours	8.762	0.980	4.659	0.693
Total ads	9.054	0.957	5.347	10.108
TV hours × Ads	0.566	0.099	0.154	10.108
Five-Program	2.386	3.407	0.000	8.474
Daypart	2.392	3.454	0.000	8.853
Genre	2.471	3.517	0.000	8.828

TABLE 2. Correlations among Exposure Measures

	Hrs. of TV Watching	Total Ads	Hours by Total Ads	Five-Program	Daypart	Genre
Hours of TV watching	1.00					
Total ads	−0.03	1.00				
Hours by total ads	0.22	0.97	1.00			
Five-Program	0.08	0.21	0.23	1.00		
Daypart	0.09	0.20	0.23	0.99	1.00	
Genre	0.08	0.20	0.22	0.99	0.98	1.00

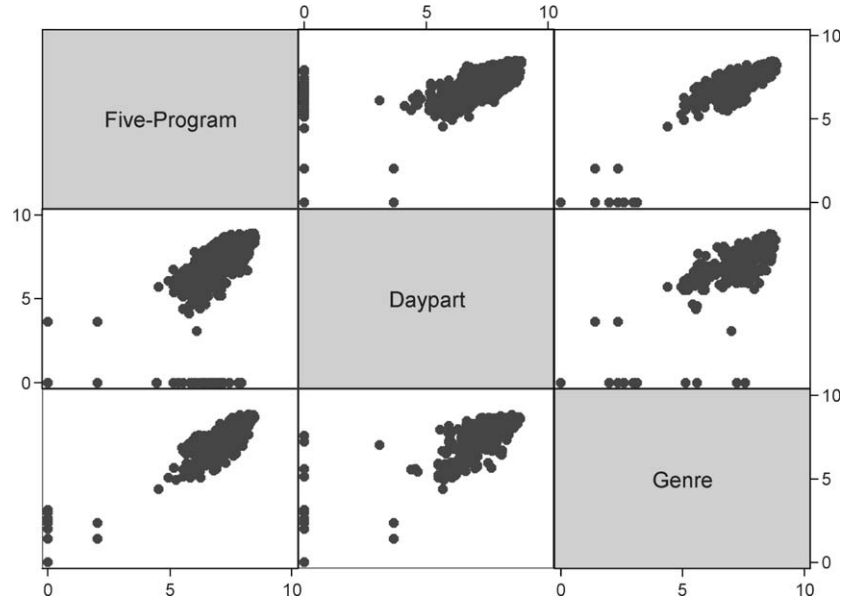

FIG. 1. Scatterplot matrix of five-program,daypart and genre measures.

similar to each other, their correlations with the other measures of exposure are quite low.

One concern of ours was that people might not be able to remember which television shows they watched, which would lead to error in our five-program and genre-based measures. To evaluate this possibility, we compared reported television viewing habits with Nielsen ratings for the same programs during the same time period. We obtained Nielsen ratings of 121 television programs during the week of February 22–28, 1999, during the first wave of the panel.[4] The survey asked respondents if they watched or did not watch several television programs. For 23 of those shows, we were able to match its audience share and ranking for the week with the percentage of respondents saying they watched the program. Correlations among the three measures are in Table 3.

TABLE 3. Correlations among Television Viewing Measures

	Needham Survey	Nielsen Share	Nielsen Ranking
Needham Survey	1		
Nielsen Share	.724	1	
Nielsen Ranking	.692	.880	1

There is a remarkable degree of correspondence among the measures. The percentage of our survey respondents reporting they watched a show is correlated with the show's Nielsen Share at .724, and with the show's ranking at .692.[5]

Also reassuring is that the top show in our survey data, ER, was also the top show according to Nielsen for the week of February 22–28. Moreover, the least watched show in our data, Moesha, was ranked 96th for the week by Nielsen, the lowest of any of the shows our survey asked about.

VALIDATING MEASURES AND PREDICTING KNOWLEDGE

The logic of our validity test is simple. We hypothesize that exposure to advertising should increase recall of facts mentioned in the advertisements and should have no effect on knowledge of facts not mentioned in the advertisements. Based on a content coding of all commercials in the CMAG database, we classified knowledge items tapped during Wave 3 into two categories: containing facts about the candidates mentioned in advertising or containing facts about the candidates not mentioned.

We have four questions tapping facts about Gore and Bush that appeared in their advertising. Respondents were asked which candidate, Bush or Gore:

1. Favors allowing young people to devote up to 1/6 of their Social Security taxes to individually-controlled investment accounts
2. Favors providing targeted tax cuts to a particular group
3. Favors drilling for oil in Alaska's Arctic National Wildlife Refuge
4. Served as a journalist in Vietnam

We also have four questions tapping facts about the two candidates that do not appear in their advertising. Respondents were asked which candidate, Bush or Gore:

1. Has a brother who is currently a state governor
2. Gave a dramatic kiss to his wife at the national nominating convention
3. Used to be partial owner of a major league baseball team
4. Favors a 72-hour waiting period for gun purchases at gun shows.

From these questions, we developed two dependent variables, one tapping knowledge of facts mentioned in the ads and one tapping knowledge of facts not mentioned in the ads. For each question answered correctly, the respondent gained a point on the knowledge scales, each of which ended up ranging from 0 to 4.

Of course, it is also necessary to control for other factors that might predict knowledge of the candidates. Our statistical model contains several other predictors (see Appendix 1 for complete question wording):

1. How many hours a day the respondent watches local and national news programs
2. How many hours a day the respondent spends reading a newspaper
3. The respondent's political efficacy, which is tapped by a 3-item scale generated from the following statements "People like me don't have a say in government decisions," "People like me can solve community problems," "No matter whom I vote for, it won't make any difference."
4. General political knowledge,[6] based on the success of the respondent in answering the following 6 questions:

- Which political party is more liberal?
- Which political party holds a majority in the US Senate?
- Which political party holds a majority in the US House?
- Trent Lott belongs to which political party?
- Tom Daschle belongs to which political party?
- Which political party voted in larger numbers for the recently passed tax cut?

5. Interest in politics, which is tapped by the respondent's agreement with the statement, "I am very interested in politics"
6. Strength of partisan identification, ranging from 0 to 3, with 3 indicating a strong Republican or Democratic identifier and 0 indicating a political independent.
7. The age of the respondent, entered as six indicator variables denoting the following age categories: 18–24, 25–34, 35–44, 45–54, 55–64, and 65 and older.
8. An indicator of whether the respondent is African-American
9. An indicator of whether the respondent is Hispanic.
10. The respondent's gender
11. The respondent's household income level
12. The respondent's level of education
13. A dummy indicator of whether the respondent's state had a competitive U.S Senate race in 2000 (Florida, Minnesota, Montana, Nevada, New Jersey, New York, Pennsylvania, Virginia, Washington).
14. A dummy indicator of whether the respondent's state was a battleground state in the presidential election (Arizona, Florida, Iowa, Maine, Michigan, Missouri, New Hampshire, New Mexico, Ohio, Oregon, Washington, Wisconsin).

In the section that follows, we estimate several statistical models, each of which predicts either knowledge of facts contained within the ads or knowledge of facts not contained within the ads. In all cases, the dependent variable is one of the 0–4 knowledge scales discussed above. Because these

scales are the sum of a series of Bernoulli trials (success or failure in answering the question), we estimated generalized linear models with binomial link functions. Unlike a standard Ordinary Least Squares regression model, which assumes a dependent variable that is continuous and ranges from negative infinity to positive infinity, the GLM is suited for a dependent variable with nominal categories and minimum and maximum possible values.

RESULTS

The full results for all 12 statistical models—two for each exposure measure–can be found in Appendix 2. In general, the control variables in all models work as expected. The most robust predictors of candidate knowledge are the respondents' levels of generalized political knowledge and their interest in politics. How much they watch television news and their levels of income are both less strong but nonetheless statistically significant predictors of political knowledge.

Because the results are fairly consistent across models and because our primary concern is the success of the six different exposure measures, we focus our attention on those variables. They are displayed in Table 4.

How do the different measures fare? Of course, one cannot directly compare the coefficients across models because each exposure measure is on a different metric. Nonetheless, one can compare the levels of statistical significance to get a general idea of which measure is a better predictor. We start with the "hours of television watching" exposure measure, which is a positive predictor of knowledge of facts in the presidential candidates' advertising. But it is only marginally significant ($z = 1.74$, $p = .083$), and it is not even close to being a significant predictor of facts not featured in advertising. Hours of television watching, then, appears to be a crude exposure measure. Total ads aired in the viewer's television market, the next measure examined, is an

TABLE 4. GLM Predictors of Candidate Knowledge

	Knowledge of Facts in Ads			Knowledge of Facts Not in Ads		
	Coefficient	SE	z-score	Coefficient	SE	z-score
TV hours	1.075	0.619	1.740	0.260	0.671	0.390
Total ads	−0.092	0.076	−1.220	−0.089	0.080	−1.110
TV hours × Ads	−0.044	0.072	−0.610	−0.071	0.076	-0.930
Five-Program	0.056	0.018	3.160	0.021	0.019	1.080
Daypart	0.057	0.017	3.260	0.024	0.019	1.270
Genre	0.058	0.017	3.380	0.024	0.019	1.250
N=445[7]						

extremely poor predictor of the knowledge scales. Indeed, it is negatively related to both of them though is not discernible from 0.

Theoretically, one might expect one of the best measures to be that which multiplies hours of viewing by the volume of ad airing. By doing so, we allow the amount of TV watching to matter only when there are some ads being aired, and the volume of advertising matters only when the individual is watching some television. But we came up short again with this interaction variable. There was no discernible relationship between this measure and the knowledge scales. This finding holds both when only the interaction variable is included in the model (Table 3) and when the main effects are entered in as well (not shown).

We find a solution when turning to the last three measures. The five-program, daypart, and genre measures are all positive and statistically significant predictors of knowledge of facts appearing in the advertising.[8] For all of them, z-scores are above 3, and p-values are less than .001. And, reassuringly, none of the three is a significant predictor of knowledge of facts not appearing in the advertising. This suggests that these exposure measures are truly tapping advertising exposure, not just some more generalized facet of knowledge gained through television watching.[9]

Each of the models presented above included only one exposure measure, but now we allow the measures to compete with each other. Given the high collinearity among the five-program, daypart and genre-based measures, however, a model that included all three would be unable to discriminate among them. Therefore, we estimated a model that included only one of these three (the parsimonious five-program measure), along with the hours of television watching, total ads and hours by ads measures. These results are displayed in Table 5, which reveals that the five-program measure is the best predictor of knowledge of facts featured in the candidates' advertisements. Even after entering the three other exposure measures into the model, the five-program measure is a robust predictor—indeed, the only statistically significant predictor. The same substantive results obtain when one substitutes the daypart or genre-based measures for the five-program measure.[10,11]

The five-program, daypart, and genre measures appear to be equally valid measures of advertising exposure. Although the most precise measure appears to have slightly more predictive power, it is not a significant improvement over the more efficient daypart and five-program measures.

Still, one might wonder about the magnitude of exposure's impact. We therefore calculated predicted counts of correct answers to questions about facts in the advertising, altering levels of the five-program exposure measure.[12] Table 6 shows that as exposure to advertising moves from its minimum to its maximum value in the data set, the predicted number of correct answers rises from 1.87 to 2.26, an increase of about .4, or a movement of 10% on the 4-point scale. Given that many sources contribute to knowledge about

TABLE 5. GLM Predictors of Knowledge of Facts in Ads

	Coefficient	SE	z
Hours of TV watching	0.519	1.761	0.290
Total ads	−0.718	1.759	−0.410
Hours TV by total ads	−0.432	4.467	−0.100
Five-Program measure	0.068	0.019	3.560
News viewing	0.003	0.018	0.160
Newspaper reading	0.046	0.034	1.330
Efficacy	0.062	0.023	2.730
General knowledge	0.365	0.031	11.600
Political interest	0.173	0.038	4.520
Strength of party ID	0.064	0.052	1.230
25–34	0.274	0.477	0.570
35–44	0.283	0.240	1.180
45–54	0.020	0.166	0.120
55–64	−0.039	0.157	−0.250
65-plus	0.308	0.172	1.800
Black	−0.245	0.187	−1.310
Hispanic	−0.164	0.236	−0.690
Male	0.092	0.122	0.760
Income	0.038	0.017	2.300
Education	0.108	0.051	2.120
Sen. Competitiveness	0.182	0.136	1.330
Pres. Competitiveness	0.319	0.151	2.110
Constant	−1.470	3.141	−0.470
Log-likelihood	−600.20		
N	445		

TABLE 6. Predicted Knowledge of Facts in Ads

Level of exposure	Predicted number of correct answers
Minimum	1.87
Mean	1.98
Maximum	2.26

candidates, and given the frequent complaint of critics that advertising contains no substance, we are impressed by the magnitude of these effects.

CONCLUSION

In our efforts to test the validity of six different measures of advertising exposure, we have found that three are far superior to the others. Two measures based on the types of programs viewers watch—one short and one long—and a measure based on the times of day that people watch television all

perform equally well in predicting knowledge of facts that appeared in the 2000 presidential candidates' advertising. Measures based on the hours per day a viewer watches television, the total volume of advertising and a combination of the two all fail to predict what they should. Given the tradeoffs between predictive power and parsimony, we would recommend the five-program approach to other researchers who want to tap advertising exposure. It requires only six questions, in contrast to ten for the daypart measure and over 25 for the genre measure.

These results also provide considerable support for the view that campaign advertising has favorable effects on viewers' candidate knowledge. The results reported here are largely consistent with research that emphasizes the positive benefits of political advertising. It appears, then, that these ads provide information about relevant campaign issues above and beyond traditional news sources. That we observed these effects while accounting for the effects of television news and newspaper consumption confirms that some voters learn information about candidates and their positions on issues from political ads (see Zhao and Chaffee, 1995).

Of course, all studies have limitations, and this one is no exception. To be sure, we have not tested all potential measures of advertising. The survey we utilized, for instance, did not contain measures of respondent attention to advertising or their recall of specific advertisements. Nonetheless, our research has taken an important first step in establishing the validity of certain measures and questioning the validity of others. For instance, we have shown that the amount of television a person watches—essentially the measure employed in the Patterson and McClure study (1976)—is not a good predictor of citizens' knowledge of facts contained within advertising.

An additional limitation of this study is that they survey responses upon which we rely were not obtained through random digit dialing. Although the data reported here have been validated against probability sample data (Putnam, 2000) and favorably compared with concurrent panel data (Eveland et al., 2003), the stratified quota sampling method used to generate the pool of respondents to this study is not the truly random. For this reason, it will be important to validate these findings using different probability sample data.

Another potential criticism of this study is endogeneity. A critic might argue that we are merely capturing television viewing, particularly, television news viewing, and not exposure to television advertising in the five-program, daypart, and genre measures. In other words, an alternative hypothesis is that people are not learning these facts about the candidates from advertising but from the shows they are watching when the ads air.

We are reassured, however, that this alternative hypothesis does not hold. First, as noted above, we have controlled for television news watching in our models with an index tapping the total hours spent watching local news and national news each day. Second, our measures do not predict knowledge of

things that did not appear in advertising but surely appeared on the news—e.g., Gore's lengthy kiss of his wife at the Democratic convention or his favoring a waiting period for gun show firearm purchases. Third, the correlations among local news watching, national news watching and the five-program, daypart, and genre measures are extremely small, ranging from .018 to .048. None of the correlations are significantly different from 0. This suggests that ad exposure and news watching are not being confounded.

In the end, we have shown that a good measure of ad exposure does not necessarily have to be complicated. Researchers would need to include only six questions on their survey instruments to use our recommended five-program measure. We urge researchers to be thoughtful—and creative—when they design survey questions to tap advertising exposure. By combining the contextual advertising data available through the Wisconsin Advertising Project with a short but select list of television viewing measures and geo-coded survey data, students of political communication will be able to generate fairly precise measures of campaign advertising exposure. We urge future research to adopt this approach and to continue to test the validity of exposure measures.

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APPENDIX 1

Question Wording and Coding

Local and National News Viewing, Newspaper Readership, and Television Viewing (Wave 3): I have listed below a variety of media that you, yourself, may or may not use. For each of the following, please place an "X" in the appropriate box to indicate how much time you spend with each medium on the average day. (If you do not spend any time using one of the listed media, "X" the "Don't Use" box for that item.) Make sure that you respond to each statement. Television. Newspaper. National TV news. Local TV news. Coding: 0 = Don't use, 1 = Less than 30 min. 2 = 30 mins. to 1 h. 3 = 1–2 h. 4 = 2–3 h. 5 = 3–4 h. 6 = 4–5 h. 7 = 5–6 h. 8 = 6–7 h. 9 = 7 or

more hours. The total news viewing variable is constructed by summing the number of hours the respondent watched local news and the number of hours the respondent watched national news.

Political Efficacy (Wave 2): In this section, I have listed a number of statements about interests and opinions. For each statement listed, I'd like to know whether you personally agree or disagree with this statement. After each statement, there are six numbers from 1–6. The higher the number, the more you tend to agree with the statement. The lower the number, the more you tend to disagree with the statement. For each statement, please circle the number that best describes your feelings about that statement. You may think many items are similar. Actually, no two items are exactly alike so be sure to "X" one box for each statement. People like me don't have a say in government decisions. People like me can solve community problems. No matter whom I vote for, it won't make any difference. Coding: 1 = I definitely disagree, 2 = I generally disagree, 3 = I moderately disagree, 4 = I moderately agree, 5 = I generally agree, 6 = I definitely agree. Responses were recoded so the most efficacious answer received the highest value. Scores on the three scales were then added together to produce a scale ranging from 3 to 18.

General Political Knowledge (Wave 4): I have listed a few questions about the major political parties. Of course, there is so much going on these days that it's impossible to keep track of all of it. In any case, do you happen to know... Which political party is more liberal? Which political party holds a majority in the US Senate? Which political party holds a majority in the US House? Trent Lott belongs to which political party? Tom Daschle belongs to which political party? Which political party voted in larger numbers for the recently passed tax cut? Coding: 1 = Democratic, 2 = Republican, 3 = Don't Know. Responses were recoded so that 1 indicates a correct answer and 0 indicates an incorrect answer or a "don't know" response. Responses across all of the questions were then summed, producing a 0 to 6 scale.

Political Interest (Wave 1): In this section, I have listed a number of statements about interests and opinions. For each statement listed, I'd like to know whether you personally agree or disagree with this statement. After each statement, there are six numbers from 1 to 6. The higher the number, the more you tend to agree with the statement. The lower the number, the more you tend to disagree with the statement. For each statement, please circle the number that best describes your feelings about that statement. You may think many items are similar. Actually, no two items are exactly alike so be sure to "X" one box for each statement. I am interested in politics. Coding: 1 = I definitely disagree, 2 = I generally disagree, 3 = I moderately disagree, 4 = I moderately agree, 5 = I generally agree, 6 = I definitely agree.

Strength of Partisanship (Wave 2): Which one of the following best describes your political affiliation? Coding: 1 = Very strong Republican, 2 = Not so strong Republican, 3 = Republican-leaning Independent, 4 = Independent, 5 = Democratic-leaning Independent, 6 = Not so strong Democrat, 7 = Very strong Democrat. Responses were recoded so that 3 = strong partisan, 2 = partisan, 1 = leaning Independent, 0 = Independent.

Age (Wave 1): Coding: 1 = 18–24, 2 = 25–34, 3 = 35–44, 4 = 45–54, 5 = 55–64, 6 = 65 and over.

African-American (Wave 1): Coding: 0 = not African-American, 1 = African-American.

Hispanic (Wave 1): Coding: 0 = not Hispanic, 1 = Hispanic.

Male (Wave 1): Coding: 0 = female, 1 = male.

Income (Wave 1): Into which of the following categories does your annual household income fall? Coding: 1 = Under $10,000, 2 = $10,000–$14,999, 3 = $15,000–$19,999, 4 = $20,000–$24,999, 5 = $25,000–$29,999, 6 = $30,000–$34,999, 7 = $35,000–$39,999, 8 = $40,000–$44,999, 9 = $45,000–$49,999, 10 = $50,000–$59,999, 11 = $60,000–$69,999, 12 = $70,000–$79,999, 13 = $80,000–$89,999, 14 = $90,000–$99,999, 15 = $100,000 or more.

Education (Wave 1): Coding: 1 = Attended elementary, 2 = Graduated from elementary, 3 = Attend high school, 4 = Graduated high/trade school, 5 = Attended college, 6 = Graduated college, 7 = Post-graduate school.

Television Genre Viewing (Wave 2): Listed below are a variety of different kinds of television programs. For each of the following, please place an "X" in the appropriate box to indicate how often you watched that type of program during the past week. For each, please indicate how many days in the past week you watched the types of television program described by checking the appropriate box. A symphony orchestra, dance or opera program. A movie. A biography program. A science program. A realistic drama. A family-oriented drama. An action–adventure program. A science fiction program. A program for learning something useful, like cooking or home repairs. A program about historical events. A sports program. A nature or wildlife program. A situation comedy (i.e., sitcom). A primetime animated program. A primetime game show. A reality-TV program. A dramatic program based on a book. A program about traveling to interesting places. A popular music program. A national news program. A local news program.

A program that discusses and examines current public issues. A soap opera. A children's cartoon program. An educational children's program. Coding: 0–7, indicating the number of days the respondent watched a program of the genre in the past week.

Television Viewing by Daypart (Wave 1): For each of the different times listed below, circle the appropriate number which indicates the main reason you watched TV, listened to the radio, read the newspaper and read magazines and used a computer on the day you are describing. Circle a "0" if you did not watch TV, did not listen to the radio, did not read newspapers, did not read magazines or did not use a computer during that time. (Circle one number for each time and each activity.) Shortly after waking up/before breakfast. During breakfast. Commuting to work. Mid to late morning. During lunch. Early to mid afternoon. Late afternoon. Commuting from work. Before dinner. During dinner. After dinner/mid to late evening. In bed/just before going to sleep. Coding: 0 = did not watch television, 1 = watched television mainly for information, mainly for entertainment or just for background.

Television Program Viewing (Wave 1): Listed below are different television programs. Please "X" each television show you watch because you really like it. ("X" as many as apply.) Game shows (in general). Daytime serials/soap operas. National talk shows (Rosie, Oprah Winfrey, Geraldo, etc.). Local news. Morning network news shows (NBC Today Show, Good Morning America). Coding: 0 = does not watch the program, 1 = watches the program.

APPENDIX 2

Complete Generalized Linear Models

NOTES

1. This stratified quota sampling method differs markedly from more conventional probability sample procedures yet produces highly comparable data. Putnam, who used the 1975 to 1998 Life Style Studies as the primary data for *Bowling Alone*, validated these data against the General Social Survey and Roper Poll (Putnam, 2000; Putnam and Yonish, 1999). This validation involved longitudinal and cross-sectional comparisons of parallel questions found in the Life Style Studies and conventional samples. He concluded that there were "surprisingly few differences between the two approaches" with the mail panel approach producing data that were "consistent with other modes of measurement" (Putnam, 2000, p. 422–424). In short, the data "reasonably represents the middle 80–90% of American society, but they do not well represent ethnic minorities, the very poor, the very rich, and the very transient" (Putnam, 2000, p. 421). Notably, a more direct comparison of attitudinal and behavioral measures from this stratified quota sampling approach with those

TABLE A1. GLM Predictors of Candidate Knowledge

	Hours of TV watching						Total ads					
	Facts in ads			Facts not in ads			Facts in ads			Facts not in ads		
	Coefficient	SE	*z*	Coefficient	SE	*z*	Coefficient	SE	*z*	Coefficient	SE	*z*
Exposure (logged)	1.075	0.619	1.740	0.260	0.671	0.390	−0.092	0.076	−1.220	−0.089	0.080	−1.110
News viewing	0.007	0.018	0.400	0.032	0.019	1.670	0.013	0.018	0.730	0.033	0.019	1.740
Newspaper reading	0.037	0.033	1.100	−0.099	0.034	−2.890	0.031	0.034	0.910	−0.104	0.035	−3.000
Efficacy	0.065	0.023	2.900	0.050	0.024	2.060	0.062	0.023	2.740	0.047	0.025	1.920
General knowledge	0.362	0.031	11.570	0.334	0.034	9.820	0.362	0.031	11.570	0.334	0.034	9.810
Political interest	0.174	0.038	4.570	0.105	0.043	2.480	0.167	0.038	4.400	0.103	0.042	2.420
Strength of party ID	0.085	0.051	1.660	0.110	0.055	1.990	0.092	0.051	1.810	0.113	0.055	2.060
25–34	0.291	0.469	0.620	−0.169	0.501	−0.340	0.288	0.470	0.610	−0.166	0.503	−0.330
35–44	0.318	0.238	1.340	−0.391	0.252	−1.550	0.248	0.236	1.050	−0.418	0.250	−1.670
45–54	0.069	0.165	0.420	−0.161	0.182	−0.890	0.022	0.165	0.130	−0.190	0.182	−1.040
55–64	0.012	0.156	0.080	−0.320	0.171	−1.870	−0.043	0.154	−0.280	−0.342	0.170	−2.010
65-plus	0.350	0.169	2.070	0.081	0.194	0.420	0.324	0.169	1.920	0.062	0.194	0.320
Black	−0.264	0.187	−1.410	−0.006	0.206	−0.030	−0.220	0.185	−1.190	−0.002	0.204	−0.010
Hispanic	−0.171	0.234	−0.730	−0.093	0.234	−0.400	−0.150	0.234	−0.640	−0.082	0.234	−0.350
Male	0.083	0.121	0.680	−0.016	0.135	−0.120	0.107	0.120	0.890	−0.006	0.134	−0.050
Income	0.038	0.017	2.300	0.032	0.019	1.710	0.036	0.016	2.160	0.032	0.019	1.680
Education	0.083	0.050	1.670	0.071	0.055	1.300	0.073	0.049	1.490	0.075	0.054	1.380
Sen. Competitiveness	−0.023	0.116	−0.200	−0.012	0.127	−0.090	0.056	0.130	0.430	0.058	0.141	0.410
Pres. Competitiveness	0.503	0.132	3.800	0.016	0.141	0.110	0.541	0.137	3.950	0.055	0.146	0.380
Constant	−3.909	0.578	−6.770	−1.365	0.620	−2.200	−2.381	0.774	−3.080	−0.404	0.824	−0.490
Log-likelihood			−607.66			−529.45			−608.43			−528.90
N			445			445			445			445

TABLE A2. GLM Predictors of Candidate Knowledge

	Hours TV by total ads						Five-Program					
	Facts in ads			Facts not in ads			Facts in ads			Facts not in ads		
	Coefficient	SE	*z*	Coefficient	SE	*z*	Coefficient	SE	*z*	Coefficient	SE	*z*
Exposure (logged)	−0.044	0.072	−0.610	−0.071	0.076	−0.930	0.056	0.018	3.160	0.021	0.019	1.080
News viewing	0.014	0.018	0.770	0.034	0.019	1.790	0.010	0.018	0.540	0.032	0.019	1.700
Newspaper reading	0.033	0.034	0.980	−0.104	0.035	−2.980	0.054	0.034	1.590	−0.090	0.035	−2.600
Efficacy	0.063	0.023	2.790	0.048	0.025	1.940	0.065	0.023	2.860	0.049	0.024	1.990
General knowledge	0.362	0.031	11.580	0.334	0.034	9.800	0.326	0.028	11.720	0.299	0.030	10.000
Political interest	0.167	0.038	4.400	0.102	0.042	2.400	0.160	0.038	4.170	0.093	0.043	2.180
Strength of party ID	0.094	0.051	1.850	0.115	0.055	2.080	0.072	0.051	1.410	0.097	0.056	1.750
25–34	0.285	0.469	0.610	−0.170	0.502	−0.340	0.281	0.469	0.600	−0.177	0.499	−0.350
35–44	0.250	0.236	1.060	−0.425	0.251	−1.690	0.242	0.237	1.020	−0.430	0.251	−1.710
45–54	0.030	0.165	0.180	−0.190	0.182	−1.040	0.035	0.164	0.220	−0.180	0.181	−0.990
55–64	−0.039	0.155	−0.250	−0.346	0.171	−2.030	−0.025	0.154	−0.160	−0.329	0.170	−1.940
65-plus	0.328	0.169	1.940	0.062	0.194	0.320	0.329	0.171	1.930	0.080	0.194	0.410
Black	−0.214	0.185	−1.160	0.006	0.204	0.030	−0.230	0.185	−1.240	−0.019	0.204	−0.090
Hispanic	−0.157	0.234	−0.670	−0.081	0.234	−0.350	−0.213	0.237	−0.900	−0.107	0.235	−0.460
Male	0.107	0.120	0.890	−0.003	0.134	−0.020	0.085	0.121	0.700	−0.019	0.134	−0.140
Income	0.035	0.016	2.140	0.031	0.019	1.640	0.036	0.017	2.150	0.032	0.019	1.690
Education	0.067	0.048	1.370	0.071	0.054	1.310	0.061	0.049	1.250	0.059	0.054	1.090
Sen. Competitiveness	0.018	0.129	0.140	0.045	0.140	0.320	0.015	0.117	0.130	−0.002	0.128	−0.010
Pres. Competitiveness	0.518	0.136	3.800	0.047	0.145	0.320	0.306	0.150	2.030	−0.043	0.162	−0.270
Constant	−2.808	0.743	−3.780	−0.566	0.792	−0.710	−3.387	0.411	−8.240	−1.198	0.432	−2.780
Log-likelihood			−608.99			−529.09			−602.43			−527.03
N			455			445			445			445

TABLE A3. GLM Predictors of Candidate Knowledge

	Genre						Daypart					
	Facts in ads			Facts not in ads			Facts in ads			Facts not in ads		
	Coefficient	SE	*z*	Coefficient	SE	*z*	Coefficient	SE	*z*	Coefficient	SE	*z*
Exposure (logged)	0.058	0.017	3.380	0.024	0.019	1.250	0.057	0.017	3.260	0.024	0.019	1.270
News viewing	0.008	0.018	0.430	0.031	0.019	1.630	0.008	0.018	0.460	0.031	0.019	1.630
Newspaper reading	0.051	0.034	1.500	−0.093	0.035	−2.670	0.051	0.034	1.500	−0.092	0.035	−2.660
Efficacy	0.067	0.023	2.960	0.051	0.024	2.100	0.066	0.023	2.920	0.051	0.024	2.090
General knowledge	0.365	0.031	11.610	0.334	0.034	9.810	0.365	0.031	11.620	0.334	0.034	9.820
Political interest	0.169	0.038	4.430	0.103	0.042	2.420	0.171	0.038	4.480	0.104	0.042	2.450
Strength of party ID	0.077	0.051	1.500	0.103	0.055	1.870	0.075	0.051	1.460	0.102	0.055	1.840
25–34	0.274	0.472	0.580	−0.178	0.500	−0.360	0.261	0.474	0.550	−0.183	0.501	−0.360
35–44	0.271	0.236	1.150	−0.404	0.249	−1.620	0.267	0.235	1.140	−0.407	0.249	−1.630
45–54	0.042	0.164	0.260	−0.165	0.181	−0.910	0.042	0.164	0.260	−0.167	0.181	−0.920
55–64	−0.040	0.154	−0.260	−0.335	0.170	−1.970	−0.032	0.154	−0.210	−0.332	0.170	−1.960
65-plus	0.311	0.171	1.820	0.080	0.194	0.410	0.325	0.171	1.900	0.084	0.194	0.430
Black	−0.204	0.185	−1.100	0.004	0.204	0.020	−0.215	0.185	−1.170	0.000	0.204	0.000
Hispanic	−0.177	0.236	−0.750	−0.088	0.234	−0.380	−0.176	0.236	−0.740	−0.086	0.234	−0.370
Male	0.100	0.121	0.830	−0.009	0.134	−0.070	0.099	0.121	0.820	−0.009	0.134	−0.070
Income	0.035	0.017	2.140	0.031	0.019	1.670	0.036	0.017	2.180	0.032	0.019	1.690
Education	0.072	0.049	1.470	0.069	0.054	1.290	0.073	0.049	1.500	0.070	0.054	1.300
Sen. Competitiveness	0.029	0.117	0.250	0.008	0.128	0.070	0.024	0.117	0.210	0.007	0.128	0.060
Pres. Competitiveness	0.259	0.150	1.730	−0.084	0.162	−0.520	0.268	0.150	1.790	−0.084	0.162	−0.520
Constant	−3.463	0.410	−8.440	−1.288	0.431	−2.990	−3.458	0.411	−8.420	−1.292	0.431	−3.000
Log-likelihood			−603.40			−528.74			−603.81			−528.72
N			445			445			445			445

assessed through an RDD sampling approach produced parallel results (Groeneman, 1994).

2. This figure is for 2002. In 2001, CMAG recorded advertising in 83 markets, and in 2000 and earlier years, the company recorded advertising in the nation's top-75 markets.
3. Values of 0 were not transformed because the natural log of 0 is undefined.
4. We obtained the Nielsen ratings for that week from page 12D of the Final Edition of the March 5, 1999, *Rocky Mountain News* of Denver.
5. Show rankings were reversed (i.e., first made last) so that the correlation between the show's rankings and the other measures of television viewing would be positive.
6. General political knowledge was measured in Wave 4, and thus it was measured after the dependent variable, knowledge of specific facts about the candidates, which comes from Wave 3. One potential concern, then , is endogeneity, i.e., that exposure to advertising may have affected our measure of general political knowledge. We do not believe this is the case because (1) the battery of questions included in the general political knowledge measure tap facts not mentioned in candidate advertising and (2) the exposure measures are non-significant predictors of general political knowledge in simple bivariate ordered probit models.
7. This is a small number given the over 3000 respondents in the first wave of the survey, but by the 3rd wave—by which time the ads have aired—only about 1300 respondents remain. Moreover, we eliminated about 20% of respondents for not residing in a media market for which we have advertising tracking data. We also used a Wave 4 measure of generalized knowledge, which excluded even more respondents. Finally, we eliminated all respondents from the analysis for whom even a single exposure measure was missing to ensure that all measures were comparable—that we were not comparing apples and oranges.
8. We included both hours of television viewing and volume of advertising as controls in these three models. Although the total number of ads aired is moderately correlated with each of the three exposure measures, the elimination of this variable from the model does not change any of the substantive findings.
9. One other way to compare these models is to estimate the change in the predicted number of correct answers that occurs by changing the value of each of the exposure measures. Moving from one standard deviation below the mean to one standard deviation above the mean results in a predicted increase of .17 correct answers using the TV watching measure, a decrease of .10 correct answers with the total ads measure, and a decrease of .04 correct answers with the TV watching by total ads measure. Yet the same change yields an increase of .26 correct answers using five-program measure, .28 correct answers with the genre-based measure and .33 correct answers with the daypart measure. These predicted counts are averages across all observations in the data set, keeping all other predictor variables at the original values with the exception of exposure.
10. Specifically, when the daypart measure is substituted for the five-program measure, the exposure coefficient is .069 ($z = 3.68$), and when the genre-based measures is substituted, the coefficient is .070 ($z = 3.79$). The coefficients on the other exposure measures remain non-significant predictors in both instances.
11. We also estimated this model with the hours of television watching by total ads interaction term eliminated to test whether this interaction term was masking the effects of the component variables. This was not the case. Hours of television watching remained an insignificant predictor of knowledge of facts in the ads ($z = 1.39$), and total ads aired in the market became a significant, but *negative* predictor of this knowledge ($z = -2.46$).
12. These predicted counts are averages across all observations in the data set, holding exposure at a constant level for all respondents but keeping the other predictor variables at the original values. The results are almost identical when substituting the daypart or genre-based measure for the five-program measure.

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