Citizens, Knowledge, and the Information Environment*

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Abstract

Variations in the quantity and quality of media coverage affect what citizens know about politics. Using data from 41 cross-sectional surveys, a series of multilevel models show that previously documented relationships between socioeconomic characteristics and knowledge vary as a function of the information environment. The difference in knowledge between citizens with low and high levels of income and education grows as the volume of information and the level of expert commentary increases. By contrast, knowledge gaps based upon income and age shrink considerably when the environment provides contextual coverage. Differences in knowledge due to race and gender are unaffected by the environmental measures used in this study. Thus, the environment does not have a uniform effect. It works selectively, increasing the advantages that accrue to certain segments of the population and leveling differences that exist between others.
Is there a permanent information underclass in the United States? Decades of research would seem to suggest so. A voluminous literature shows that socioeconomic factors, such as being rich, educated, white, or male, are positively associated with political knowledge (e.g., Bennett 1988; 1989; Delli Carpini and Keeter 1996, Luskin 1990; Neuman 1986). So well developed is this literature that the characteristics commonly associated with political knowledge are referred to as the “usual suspects” (e.g., Delli Carpini and Keeter 1996, 179). However, the resulting image is one of a static relationship between demographic factors and political awareness. Not only is this a normatively unsatisfying position, but it also strikes us as inaccurate. Citizens experience politics in an environment that changes over time as domestic and foreign developments unfold. Yet, we know little about how variations in naturally occurring information environments affect what citizens know about politics.

Determining the nature of this effect has important implications for representative democracy. The uneven distribution of political knowledge biases the shape of collective opinion (Althaus 2003). Not only does political knowledge help citizens form stable, consistent opinions, but it also enables them translate their opinions into meaningful forms of political participation (Delli Carpini and Keeter 1996). If variations in media coverage do little to offset the information advantage of being white, wealthy, older, or educated, then large segments of the population will remain on the periphery of the American political system. If, on the other hand, the information environment can reduce the differences in political knowledge that exist between certain elements of society, there is hope that traditionally disadvantaged groups, such as the uneducated or the poor, can make their voices heard.

Our study investigates this issue by analyzing over three dozen public opinion surveys for a period of more than 10 years. We examine whether differences in the quantity and quality of
media coverage alter the relationship between individual-level predictors, such as education, and political knowledge. In the end, we reject the view that certain individuals are doomed to be “know-nothings” (Bennett 1988). The information environment can—and does—weaken some well known relationships between individual-level factors and political knowledge.

**The Information Environment and Political Knowledge**

Our use of the term “environment” is distinct from scholars who study the influence of contextual factors, such as neighborhoods or workplaces (e.g., Huckfeldt 2001; Krassa 1990; Mondak and Mutz 2002). We also distinguish ourselves from those who study the broader political environment, such as district competitiveness or particular institutional arrangements (e.g., Gordon and Segura 1997; Hutchings 2001; 2003). Instead, we focus our attention on the information to which people are exposed in the print and broadcast media. This includes statements made by public officials, interest groups, journalists, and other relevant actors regarding political developments and policy issues. Of course, in making this distinction, we do not deny the role that neighborhoods, workplaces, and other contexts play in filtering information citizens receive from the mass media.  

Our argument is that the information environment, to the extent that it has any effect on political knowledge, likely affects different citizens (e.g., the less educated versus the well

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1 We also distinguish ourselves from the literature on campaign effects. While there is evidence that learning takes place throughout the course of an election campaign (Alvarez 1997), few studies directly examine the information environment as we do below (e.g., Alvarez 1997; Brians and Wattenberg 1996; Zhao and Chaffee 1995). Those that do have a peripheral interest in knowledge, focusing instead on voter perceptions and/or vote choice (e.g., Just et al. 1996).
educated) in different ways (see also Rivers 1988; Sniderman, Brody, and Tetlock 1991). We concentrate on three environmental-level influences: the volume of media coverage, expert commentary, and contextual news reporting. We focus on these particular factors because each has clear implications for well established relationships between the usual suspects (e.g., age, education, and income) and political knowledge.

**Volume of Media Coverage**

Scholars have recognized the role that opportunity plays in the acquisition of political knowledge (e.g., Gordon and Segura 1997; Luskin 1990). Studies have shown an association between the availability of political information, such as front page coverage of a topic in the media, and citizen knowledge (Nicholson 2003; also see Rhine, Bennett, and Flickinger 2001; Delli Carpini and Keeter 1996). However, it would be premature to conclude that widespread political ignorance can be cured merely by increasing media coverage of political developments.² Two often, the presentation of news does not match the processing skills of the audience. Graber (2004) writes, “[stories] are routinely written or narrated at an eighth-grade, or even twelfth-grade, comprehension level that ignores the fact that most American adults do not function comfortably above a sixth-grade level” (p. 558). Thus, opportunity is not the only factor that conditions whether someone will learn about a subject; ability, or having sufficient cognitive capacity, also matters. Some people simply are better at learning, retaining, and extrapolating from information they encounter in the media (Luskin 1990).

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² Indeed, some scholars maintain there already is an abundance of political information in the contemporary United States (e.g., Graber 2004; Bimber 2003; Lupia and McCubbins 1998).
On this point, scholars have observed that infusions of information into society have an uneven effect on citizen knowledge (Tichenor, Donohue, and Olien 1970; see Zaller 1992 for a more recent treatment). The well-informed have more elaborate schemata for sorting and storing information (Fiske, Kinder, and Larter 1983; Fiske, Lau, and Smith 1990; Lau and Erber 1985). Or, to put it in Bennett’s words, “Old information aids in acquiring new” (1994, 194). Thus while it is true that some minimal amount of information must be available in order for citizens to have knowledge of the world around them, there is reason to question the notion that exposing citizens to more information will result in increased knowledge for all individuals. Due to the cognitive differences between individuals who already have some political knowledge and those who do not, simply increasing the volume of information in the environment is likely to exacerbate existing differences between them. We therefore expect increases in the volume of information to strengthen preexisting relationships between the usual suspects (e.g., education, income, and age) and political knowledge.

**Expert Commentary**

Experts figure prominently in news about politics (Page and Shapiro 1992). They also play an important role in raising and framing political issues (Zaller 1992). Although research has shown that these sources exert a sizeable influence on public policy preferences (Page, Shapiro, and Dempsey 1987), we dispute the notion that increasing expert commentary will

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3 A similar dynamic has been observed in studies of priming, where well informed individuals are more likely to manifest priming effects than their least informed counterparts (Krosnick and Brannon 1993). The difference arises from the ability of the well informed to understand news content, store the information or its implications in memory, and retrieve it at a later date.
provide a boost to the bottom dwellers of the knowledge distribution. Our skepticism reflects research in two different areas. First, to say that citizens take cues from experts on matters of public policy does not imply that citizens acquire or retain factual information in the process. In fact, psychological research shows that individuals pay attention to source credibility in place of the kind of systematic processing that might lead to knowledge gains (Chaiken 1980; also see Fiske and Taylor 1991, 480-81). Merely listening to experts does not encourage citizens to think deeply about political issues in the news. In this respect, taking expert cues may be inversely related to knowledge.

Second, the very traits that give experts credibility with members of the public—long years of training and specialized experience in a particular field—might hinder their ability to communicate with the average citizen. Experts and lay people “see things differently” (Margolis 1996, 11), a discrepancy Margolis ascribes to different experiences, patterns of reasoning, and, ultimately, forms of communication. To the extent that citizens with low levels of knowledge are less active (Graber 1988; Neuman 1986) and therefore have fewer political experiences to draw upon, they are the least equipped to digest policy relevant information from experts in the media. Thus, increasing the flow of expert information does not necessarily lead to higher levels of knowledge for all citizens; instead, we expect it to reinforce individual-level differences in knowledge that are based on factors such as age, education, and income.

**Contextual Coverage**

Scholars who study the media often talk about the quality of news reporting in terms of the level of contextual coverage (e.g., Bennett 2003; Graber 2004; Postman 1985). As the name

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4 See Lupia and McCubbins (1998) or Kuklinski et al. (2001) for other ways to evaluate the quality of information.
implies, contextual coverage refers to any kind of reporting that discusses the historical, political, or social background of a political issue. This includes articles that consider why a particular policy action has been taken, that discuss the consequences of a policy change, or that provide an in-depth discussion of a policy problem. Although contextual coverage has a variety of guises, its essential characteristic is that it allows the average person to assess the meaning of an issue within the larger context of the political world (Graber 2004, 558). It tells citizens why an issue “matters.”

All this bears upon knowledge because any kind of learning—including that which pertains to politics—is active, which means that it requires attention and effort (Lupia and McCubbins 1998; Luskin 1990). Insofar as contextual coverage increases a person’s motivation to attend to politics, it has the potential to increase citizen knowledge. Contextual coverage also takes complex or ambiguous events and makes them understandable (Neuman, Just, and Crigler 1992). We believe, therefore, that it will reduce the advantage that typically accrues to highly educated, wealthy, interested, or older individuals. Unlike increasing the volume of information

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5 Psychological studies show that motivation can be manipulated through the presentation of information. In the typical study, a researcher induces motivation by exposing subjects to messages on topics of high personal relevance or telling them they have the sole responsibility for a decision (Eagly and Chaiken 1984). When subjects think a decision or situation is going to directly affect them, they are characterized as having high “outcome involvement” and subsequently devote more cognitive resources to the decision making task (Fiske and Taylor 1991, 487-489).
or expert commentary, higher amounts of contextual coverage should level the playing field when it comes to political knowledge.⁶

Summary of Expectations

The information environment may affect the opportunity to gain knowledge by making information about politics more or less available. But because politics is “more abstract and remote” than other subjects citizens encounter (Luskin 1990), a person’s cognitive abilities condition how much they will learn from increases in the volume of media coverage and expert commentary. Many Americans simply don’t understand the news (Graber 2004). As a result, we expect that increases in both the volume of media coverage and the level of expert commentary will reinforce the knowledge gap that exists between individuals with low and high socioeconomic status (SES). Contextual coverage, on the other hand, motivates and clarifies. In situating an issue or development, it tells citizens why their attention is warranted (Graber 2004; also see Bennett 2003). It also makes complex subjects more understandable (Neuman, Just, and Crigler 1992). We therefore expect increases in this kind of news reporting to reduce differences in political knowledge that are based on education, income, and other socioeconomic factors.

⁶Scholars have not completely ignored the role of motivation and learning. In several recent treatments of motivation and knowledge, however, it is the political environment that scholars have examined. For example, studies have shown that situational factors, such as the competitiveness of one’s district or the demographic profile of one’s representative, can motivate greater levels of attentiveness which in turn bolster levels of political knowledge (Hutchings 2001, 2003; also see Bennett and Bennett 1993 or Gordon and Segura 1997).
We illustrate these relationships with an issue that appears in our own data: Social Security reform. Given the complicated nature of the financial problems facing the program, increasing the number of news stories devoted to Social Security reform will not increase citizen knowledge if people don’t understand the information they are encountering. This information may be particularly difficult to process if it comes from experts such as Alan Greenspan or the Board of Trustees overseeing Social Security. Contextual coverage, by contrast, can reverse long standing relationships between socioeconomic factors and political knowledge if it provides citizens with basic information about Social Security (e.g., the “pay as you go” structure of the program), and if it tells citizens why Social Security reform is such a pressing issue in the minds of political elites (e.g., impending demographic changes that will require major changes in the way the program is funded).

**Data and Methods**

To test our hypotheses regarding volume, expertise, and contextual coverage, we combined 41 existing public opinion surveys and collected data on the information environment prior to each one of these surveys. The magnitude of this data collection effort required that a number of decisions be made regarding the measurement of knowledge and the information environment. We summarize the most important of these decisions here and provide additional details in the Appendix.

**Measuring Knowledge**

Traditionally, political knowledge has been categorized as either chronic or domain-specific (Zaller 1992; Delli Carpini and Keeter 1996; Gilens 2001). Chronic, or general, knowledge consists of civics-style facts one might learn from a government textbook, such as the
branch of the federal government which can declare laws unconstitutional or the vote margin
needed in Congress to overturn a presidential veto. By contrast, policy- or domain-specific
knowledge represents facts about particular programs, policies, or problems, such as the percent
of the budget devoted to foreign aid or recent trends in the crime rate. Chronic measures are
widely available and therefore tend to be used more frequently (Gilens 2001, 380), but they
suffer from an important limitation. Once chronic knowledge is obtained, the typical citizen
might go years, decades, or even a lifetime without the need to update their knowledge of who
occupies the vice presidency, which party controls the House of Representatives, or the
protections guaranteed by the First Amendment (Graber 2004, 561). For this reason, several
scholars have argued that domain-specific measures are preferable when trying to examine the
impact of the information environment (Iyengar 1990; Zaller 1992, 336-7). Following the
preference for policy-specific information, we focus on news events (Price and Zaller 1993) or
what Delli Carpini and Keeter call “surveillance” issues. Survey questions about these issues
have one important quality: knowing the correct answer depends almost exclusively on recent
exposure to information in the media rather than learning that occurred years ago.

Our study of the information environment employs 41 cross-sectional public opinion
These survey questions asked respondents about recent political developments (e.g., “Thinking
about what you have heard or seen in the news lately, have U.S. forces killed anyone in Haiti?”),
and hence they are more specific and topical than general knowledge questions. However, it was
precisely because the questions asked respondents about specific, recent political developments
that we expected to observe a relationship between features of the information environment and performance on the knowledge questions.⁷

The dependent variable in our analysis is a dichotomous measure coded “1” if the respondent answered the knowledge question correctly and “0” otherwise. Over half of the surveys we selected explicitly reminded respondents of their right to reply “don’t know.” In those instances, we follow Mondak’s (2001, 228) practice of randomly assigning missing responses to substantive categories.⁸

**Individual-Level Predictors**

Following in the tradition of researchers who have examined the individual-level predictors of political knowledge (e.g., Bennett 1988; 1989; Delli Carpini and Keeter 1996, Luskin 1990; Neuman 1986), we included measures of education, income, age, race, and gender in our models.⁹ In addition, several studies have documented that following politics in the news is associated with higher levels of political knowledge (Delli Carpini and Keeter 1996; Luskin

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⁷ Although the subject of these questions varies over time, they are equivalent measures of knowledge in at least one respect: they have passed Zaller’s (2003) “burglar alarm” news standard, which is to say that they represent acute problems and pressing issues journalists were covering in the weeks leading up to the survey (also see Schudson 1998).

⁸ Our conclusions remain the same when we use the original version of the dependent variable and when we reassign all “don’t know” responses (see supplemental Addendum A).

⁹ The range and coding for the demographic variables is as follows: education (1-7; 7=post-graduate), income (1-6; 6=$100,000+), age (18-97; 97=97 years old), black (0-1; 1=African-American), female (0-1; 1=female). Continuous variables were centered around their mean.
1990). Like previous scholars, we view the “follows” measure as conveying important information about exposure or attention to the information environment (Dalton, Beck, and Huckfeldt 1998; Hetherington 1996). The follows measure used below improves upon past research because it is specific to the particular surveillance issue mentioned in the knowledge question (e.g., “How closely have you been following U.S. military activity in Haiti?”).  

The Information Environment

We conducted a content analysis of the full text transcripts of three national media outlets (the Associated Press, USA Today, and CBS Nightly News) during the six weeks prior to the first day of each PSRA survey. As major wire, print, and broadcast news sources, these outlets provide a fairly good picture of the information environment in the weeks leading up to the PSRA survey. Once we identified the relevant sample of media reports in each media outlet, we coded the reports for information regarding the total number of stories, the number of experts contributing to the story, and the level of contextual information contained in each story.

In this study we use three variables from the media content analysis that have clear implications for our theoretical argument. We operationalize the volume of information with a

10 Coding categories are: 1=not at all closely; 2=not too closely; 3=fairly closely; 4=very closely.

11 Media reports were obtained from Lexis-Nexis Academic Universe and evaluated by multiple coders. Results from an intercoder reliability analysis are reported in the Appendix.

12 A story was considered relevant as long as it discussed the issue underlying the knowledge question. For example, if PSRA asked respondents about recent congressional action regarding prescription drug discount cards, we included stories that discussed prescription drugs, not just those that mentioned drug cards.
sum of the number of stories reported by all three media outlets during the six weeks leading up to the survey. We use a composite measure because we are interested in the extent to which information about a particular surveillance issue is plentiful, rather than patterns of coverage associated with specific sources. The greater the coverage of an issue across the different outlets, the higher the value on *Volume*.\(^{13}\)

To test our hypothesis regarding expert commentary, we distinguished between three kinds of information environments: those in which experts are not mentioned in any of the media reports, those in which a large number of experts are quoted or paraphrased in the news, and, finally, an intermediate case in which some experts are mentioned.\(^ {14}\) Although the distinction between issues with no, some, and a lot of expert commentary ultimately is a subjective one, our three point measure (*Expert Commentary*) makes sense from a theoretical standpoint. Past research into the behavior of citizens (e.g., Lupia 1994; Popkin 1991) casts doubt on the notion that they will be sensitive to slight changes in the level of expert commentary. Citizens are cognizant of differences in the information environment, but only

\(^{13}\) Our summary measure of volume correlates highly with the raw article counts for each of the three media outlets (Pearson’s r ranges from .71 to .96 with \(p < .001\)). The results we report later are robust to alternative measures of volume (see supplemental Addendum B).

\(^{14}\) For each issue, we first tallied the number of experts that were quoted or paraphrased in media reports. The distribution of our cases was such that a three point distinction between cases with no, some, and a lot of expert commentary provided for the most natural breakpoints. We tried alternate versions of the expert variable (e.g., a four point measure) and found similar results. We did not use the original, continuous measure because of the presence of two outliers which had an unusually high level of expert commentary.
when such differences are important enough to merit their attention (Lupia and McCubbins 1998).

We created our third, and final, environmental-level variable in two steps. Coders first classified every news article into one of three categories: stories that did not provide any contextual information, stories with some contextual information, and stories that supplied a high level of contextual information (see Appendix for details on coding). Because we have expectations about the effect of environments that are high in contextual coverage, the measure we use in the analysis (Contextual Coverage) is a continuous variable representing the percentage of stories on a particular subject that were coded as “high.”

In addition to the effect of individual- and environmental-level factors, subtle differences in survey topics or administration can affect patterns of political knowledge. One obvious factor is the inherent difficulty of the question. When respondents are confronted with a question that is worded in a confusing manner or when they are queried about a complex subject, the mean of all respondents answering this item will be lower than we would otherwise expect. Using item response theory (Hambleton and Swaminathan 1985; Lord and Novick 1968), we created a measure of question difficulty that we use to control for differences across surveys. In its original form, Item Difficulty represents the objective probability of correctly answering a knowledge question. We multiplied the variable by negative 1 so that higher values indicate a more difficult question.

A Multilevel Model

Our data combine survey respondents who are nested in different information environments, which is to say that we have data at two levels. The first is the level of the individual survey respondent; the second corresponds to the information environment preceding
each survey. Because individuals in any given survey confront the same information environment, there is a significant amount of clustering in our data. In this situation, ordinary least squares regression (or any method of estimation that assumes a “flat” dataset) will generate standard errors that are too small, which means scholars will infer effects when they do not exist (Steenbergen and Jones 2002). Multilevel models are an appropriate solution (Bryk and Raudenbush 1992; Goldstein 2003; see Rohrschneider 2002 for an application).

The general multilevel model can be specified as three equations:

\[ Y_{ij} = \beta_{0j} + \beta_{1j} x_{ij} + \ldots + \beta_{kj} x_{kj} + \varepsilon_{ij} \]  
\[ \beta_{0j} = \gamma_{00} + \gamma_{0i} z_{ij} + \ldots + \gamma_{0q} z_{ij} + \delta_{0j} \]  
\[ \beta_{kj} = \gamma_{k0} + \gamma_{ki} z_{ij} + \ldots + \gamma_{kq} z_{ij} + \delta_{kj} \]

In this formulation, \( Y_{ij} \) is a level-1 dependent variable and equation (1) corresponds to a simple regression model with \( k \) individual-level predictors. Where the multilevel model departs from the typical regression is that the parameters in the first equation are allowed to vary across the \( j \) level-2 units. Thus, equations (2) and (3) model the variation in \( \beta_{0j} \) and \( \beta_{kj} \) as a function of the level-2 variables (represented by \( z_{1} \ldots z_{q} \)).\(^{15}\) Equations (2) and (3) also include disturbance terms (\( \delta \)).

In the context of our study, knowledge is modeled as a function of the usual suspects. The environment may raise or lower the average level of knowledge in a survey (measured by \( \beta_{0j} \)), or it may exert its influence more subtly, by strengthening or weakening the relationship between one or more of the usual suspects and knowledge (measured by \( \beta_{kj} \)).

\(^{15}\) The relationship posited by equation (3) commonly is referred to as a “cross-level interaction.”
Empirical Results

We argue that in addition to the important individual-level predictors of citizen knowledge, variations in the information environment affect what citizens know about politics. Thus, the first step in our analysis was to document that knowledge of recent political developments did in fact change across the 41 surveys in our study. If it did not, there would be little reason to look beyond the stable individual-level predictors we know to be associated with knowledge.

Table 1 presents the percentage of respondents giving the correct response to a question tapping their knowledge of surveillance issues from 1992 to 2003.

Insert Table 1 here.

As Table 1 demonstrates, levels of political knowledge were anything but constant across the topics queried in the PSRA surveys, ranging from a low of 4% (President Bush’s drug plan) to a high of 94% (West Nile Virus). There also is no obvious pattern to citizen knowledge on this sample of issues. Citizens are no more—or less—knowledgeable about partisan issues (compare, for example, the varying levels of knowledge about Social Security and Medicare). Nor does there appear to be a pattern in how well citizens perform on questions having to do with public health issues, a frequent subject in our surveys. We remain hopeful, then, that at least some portion of political knowledge can be linked to different features of the information environment across these subjects.

It is equally important that we also observe variation in the levels of our environmental variables. When it comes to the volume of coverage for issues in our sample, the mean level of Volume was 18 news stories. The variation around that mean was substantial, however, with issues being covered by as few as 2 or as many as 57 stories. As for the distribution of Expert
Commentary, approximately 40% of the issues in our study were coded as having no expert commentary, half were coded as having some, and 10% were coded as having a lot. Finally, the issues we examined represent the full range of values on Contextual Coverage (0 to 100). There is some initial evidence of a relationship between the information environment and aggregate levels of political knowledge in the bivariate correlations. Volume and Expert Commentary are positively correlated with knowledge at the survey level ($r = .40$ and .53, respectively; $p < .01$).

As we argued earlier, variation in the information environment may influence citizen knowledge in two ways, by affecting the average level of knowledge ($\beta_0$) and by moderating the relationship between individual-level predictors and knowledge ($\beta_v$). By way of motivating the analysis that comes later, we first specify the relationship between individual-level predictors and knowledge as a random coefficients model, which takes the following form:

$$Y_i = \beta_0 + \beta_v x_i + \ldots + \beta_v x_{i0} + \varepsilon_i$$  \hspace{1cm} (4)

where the parameters, $\beta_0$ and $\beta_v$, are a function of a grand mean and a random error:

$$\beta_0 = \gamma_0 + \delta_0$$  \hspace{1cm} (5)

$$\beta_v = \gamma_v + \delta_v$$  \hspace{1cm} (6)

As a submodel of the general multilevel model described earlier, this formulation will allow us to determine empirically if the intercept ($\beta_0$) and the slopes ($\beta_v$) vary across the level-2 units (i.e., the information environment preceding each of our 41 surveys). If the variances of the random effects are equal to zero, the relationship between level-1 variables and knowledge does not vary systematically across level-2 units. Table 2 reports the results of that analysis.

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16 The correlation between Contextual Coverage and knowledge is insignificant ($p > .30$).

17 Our dependent variable is dichotomous, so we use a logit link function (Guo and Zhao 2000).
Insert Table 2 here.

The coefficients in the top portion of the table represent the average of the slopes across the 41 surveys. For example, we can say that on average, an individual’s level of education is positively related to political knowledge ($p < .01$). In general, the variables in Table 2 perform as one would expect given past research in this area. Higher levels of political knowledge are associated with having a high income, being older and non-black, and following a particular issue in the news.

The bottom portion of the table provides estimates of the variances of the random effects and a test of the null hypothesis that these variance components are equal to zero. For instance, the estimated variance of the slope for the education coefficient is .004. The $\chi^2$ statistic of 118.1 (not shown) is significant at the $p < .01$ level. We can conclude that the relationship between education and knowledge varies significantly across the surveys. The fact that the variance of the intercept also is significant indicates the presence of significant survey-level variation in knowledge. In other words, both the intercept ($\beta_o$) and the slopes of our individual-level predictors ($\beta_k$) vary across the level-2 units, suggesting that changes in the macro-level information environment affect individual-level patterns of political knowledge.\(^{18}\)

\(^{18}\) We also estimated a random coefficients model with dummy variables for south, rural, and Democratic or Republican party affiliation. With the exception of South, which was negatively signed ($p < .10$), none of these variables had a significant effect on knowledge. The variance component for South was insignificant, so we exclude it from the rest of the analysis.
Table 3 reports the results of a series of multilevel models that attempt to account for the variance in the parameters. All three models have coefficients for fixed effects, which represent the average effect of a level-1 variable across the 41 information environments. The middle portion of the table gives estimates for the random intercept equation. We model variation in the intercept as a function of the difficulty of the question as well as Volume, Expert Commentary, and Contextual Coverage. Finally, the bottom part of Table 3 provides estimates for the random slopes models. We model variation in the coefficients for education, age, and related variables as a function of our three key level-2 variables. The column headings indicate that we do this in stages, first exploring the extent to which the effect of the usual suspects vary with volume, then doing the same for experts and contextual coverage.

The fixed effects are similar across all three specifications. Higher levels of education, income, and age tend to increase knowledge as does following an issue in the news. Being black or female is associated with lower levels of knowledge. So far, these results confirm previous research on the relationship between socioeconomic factors and political knowledge.

19 Statistical estimates were generated using HLM 5.05, a multilevel modeling program developed by Bryk and Raudenbush (1992). We estimated our models using full and restricted maximum likelihood and the substantive results are the same.

20 We present our results in three separate models because of a fairly high correlation between Expert Commentary and Volume of Information ($r = .52; \ p < .001$). Due to the large number of parameters that are estimated by multilevel models, Bryk and Raudenbush (1992) recommend running submodels, as we have done here, as opposed to saturated models, which consume many degrees of freedom.
Turning next to the coefficients for the random intercepts equation, we see that part of the systematic variation in the average level of knowledge ($\beta_r$) can be explained by differences in the difficulty of the question and the total volume of information in the environment. The negative coefficient on *Item Difficulty* indicates that respondents do worse on more difficult questions. By contrast, the coefficient on *Volume* is uniformly positive and significant, suggesting that the average level of knowledge in a survey rises along with media coverage of an issue.

The crucial question is whether the effects of individual-level predictors are conditional upon the information environment. The presence of significant cross-level interactions in the lower part of Table 3 suggests that they are. The first column of estimates in Table 3 reveals that the slope coefficients for education and income are not constant across high and low volume information environments. More precisely, the positive sign on the cross-level interaction indicates that the slope coefficients for these variables become steeper as the volume of information rises. The positive relationship that exists between education and knowledge is strengthened as information becomes more plentiful. The same is true for *Expert Commentary* (i.e., the effects of education and income become stronger as the level of expert commentary rises). The negative coefficient on several cross-level interactions indicates that the environment also may attenuate relationships between an individual-level predictor and knowledge. Consider the final series of estimates in Table 3. When the environment is rich in contextual information, the relationships between knowledge, on the one hand, and income and age, on the other, weaken. Thus, the poor and the young *can* become informed about recent political developments—but only if they first are told why an issue is important.
The substantive impact of these and other cross-level interactions is best displayed graphically. Figure 1 demonstrates how increasing values of *Volume* and *Expert Commentary* increase the knowledge gap that exists between individuals at high and low levels of education and income.

Insert Figure 1 here.

Examining the Panel A, the thin black line shows that in a low volume information environment, knowledge increases only slightly (from 36% to just over 44%) as education varies ± 2 standard deviations around its mean. When the volume of information is high, there is a twenty one point difference (from 48% to 69%) in the percentage of correct responses.\(^{21}\) Panel B shows a similar pattern. There is a four percentage point difference between knowledge levels across the entire range of income for respondents nested in a low volume environment. The effect is three times as large (a 13 percentage point difference, from 54% to 67%) for respondents in a high volume information environment. Also evident from both panels is a sizeable intercept shift, reflecting the significant effect of *Volume* in the random intercept equation. Increasing the availability of information corresponds with an increase in overall levels of knowledge, but we now know that it does so primarily by giving a boost to the already politically aware.

Panel C shows that in an environment that is devoid of expert commentary, there is a 9 percentage point difference in knowledge levels for individuals with low and high levels of education (the difference between 41% and 50%). In an environment that is rich in expert commentary, the knowledge gap between high and low education respondents doubles, to 18% (the difference between 42% and 60%). A similar picture emerges from Panel D, where the

\(^{21}\) In Figures 1 and 2, low and high values on the environmental variables are represented by the average values of the upper and lower quartiles.
knowledge gap between low and high income respondents goes from 4 percentage points (the difference between 44% and 47%) to 13 percentage points (the difference between 44% and 57%) as the level of expert commentary rises. Unlike the intercept shift that was observed in Panels A and B, increasing the flow of expert commentary does not appear to influence the average level of knowledge in our surveys.22

Consistent with our expectations, contextual news coverage attenuates the effect of age and income on knowledge. This general pattern is revealed in the slopes depicted in Figure 2, which become less steep for respondents in an environment with a lot of contextual coverage.

Insert Figure 2 here

In the top panel, when the environment provides few contextual cues, there is a 13 percentage point difference between respondents with low and high levels of income (the difference between 44% and 57%). This difference is nearly eliminated (2 percentage points) in an environment that is rich in contextual cues. Varying levels of Contextual Coverage have just as dramatic an effect on the relationship between age and knowledge. What once was a 13 percentage point difference in knowledge between low and high income respondents in an environment devoid of contextual coverage (the difference between 44% and 57%) becomes a 3 percentage point difference when contextual cues are abundant.

Putting Figures 1 and 2 in perspective, our results indicate that factors such as education, income, and age—characteristics that consistently have been shown to be related to political knowledge—have a variable effect. Thus, what has for decades been characterized as a series of

22 We do not graph the effect of Volume and Expert Commentary on follows, but our analysis indicates that both environmental-level factors strengthen the relationship between following the news and political knowledge. In that sense, the graphical portrayal is similar to Figure 1.
static relationships appears to vary systematically with the features of the information environment.

The presence of statistically significant variance components in Table 2 was the motivation for a multilevel model. As such, a common way of assessing the explanatory power of a multilevel model is to calculate the proportion variance explained in the parameters as one goes from a random coefficients model to one that includes level-2 predictors. Accounting for volume, expert commentary, and contextual coverage reduces the variance in the intercept coefficient by nearly 40 percent; it reduces the variance in the education, income, and follows parameters by about a quarter. Thus, not only were we able to account for significant variation in the average level of knowledge across our 41 surveys, but we also made significant headway in understanding how the effects of education, income, and following politics vary with changes in the information environment.

The information environment has a substantial effect on the relationship of several of our variables, but as Table 3 makes clear, cross-level interactions for race and gender were insignificant. Thus, changes in the volume of information, expert commentary, and contextual coverage do not account for much of the variation in the parameters for race and gender. Their causal heterogeneity may have environmental roots, but not necessarily in the way we operationalized it.

23 These figures were calculated by comparing variance components the models in Table 3 (not shown) and the random coefficients model. For example, the percent reduction in variance for the education parameter is: \[\frac{(0.00433 - 0.00323)}{0.00433} \times 100 = 25\%\]. Despite the sizeable reduction for several parameters, the variance components remain statistically significant \((p < .05)\).
Another concern has to do with the fact that many of the surveillance issues in this study are public health topics. To the extent our sample of issues is biased, this threatens the external validity of our results (i.e. “health knowledge” as opposed to knowledge); it also could violate the assumption that the j-units are sampled randomly. In analyses not reported here, we sought to determine if issue type was significantly related to the variation in the parameters. In the aggregate, citizens do not have higher levels of knowledge about health issues. However, two new findings did emerge. On health issues, the differences between men and women are magnified. Health issues also strengthen the relationship between following an issue and political knowledge. More important for our purposes here, controlling for the differences between health topics and other surveillance issues does not alter the patterns observed in Table 3. In these and other analyses, the powerful effects of the information environment on knowledge are robust to alternative specifications.

Conclusion

Scholars have long recognized that the quality of public opinion depends in large part upon the information and ideas that are conveyed to it (e.g., Page 1996; Key 1961; Robertson 1976). Likewise, the ability of citizens to monitor the soundness of policies and the performance of politicians depends on a media that functions as their “eyes and ears” (Graber 2003, 146). Examining over three dozen issues for a period of more than 10 years, this study has shown that the information environment has a powerful effect on knowledge.

Future research should consider other differences in issue type. Neuman, Just, and Crigler (1992, 102) contend that the relationship between cognitive skill, attention to the news, and knowledge might vary according to the remoteness of an issue.
Far from being static, well documented relationships between individual-level characteristics and knowledge vary as a function of the information environment. Differences in knowledge that have been attributed to education, income, and interest become even greater in environments where information is plentiful (measured either in terms of volume or expert commentary). One particular feature of the information environment—the level of contextual coverage—has the remarkable ability to reduce the relationship between knowledge and factors such as income and age. Because the issues that received the most coverage (in terms of the volume of stories) did not necessarily have the most contextual coverage ($p > .17$), the effects we observed are not likely to counteract one another. Thus, the environment has an important, although nuanced, effect: under some conditions it may reinforce existing differences in political knowledge; under others, those differences may weaken or disappear altogether.

At the same time, the environmental-level variables we examined in this study did not do a good job of accounting for variation in the relationship between political knowledge and several other individual-level predictors (especially gender and race). Thus, future researchers are left to determine if identifiable features of the information environment are able to attenuate the long standing relationship between, say, a person’s race and their level of political knowledge. While we found little evidence that the effect of race varied by issue type, a more refined measure of the information environment—perhaps one providing information about the identity and distribution of cue givers on a particular issue (e.g., Kuklinski and Hurley 1994)—might be fruitful.

Our findings have important implications for scholars, journalists, and political leaders. Simply providing more information (in the form of more stories or greater expert commentary) is likely to reinforce the knowledge gap that exists between people with low and high levels of
income and education. Furthermore, the tendency of the media to provide “simplistic, nonsubstantive, nonhistorical and noncontextual” coverage (Postman 1985, 141, emphasis added; also see Bennett 2003) is particularly problematic. As we noted earlier, increasing the amount of contextual coverage was the only factor that was able to reduce the information advantages that accrue to high SES individuals.

Our findings beg the question of exactly what citizens need to know in order to function effectively in a democratic society (Graber 2001; Hutchings 2003; Lupia and McCubbins 1998). In recent years, scholars have recast citizenship as a “monitorial obligation” (Schudson 1998; also see Zaller 2003). According to this perspective, citizens pay attention to a wide variety of issues, although none too closely. They do not gather information actively; instead, they survey the environment just carefully enough to “detect threats.” But the problems confronting modern societies are complex, which means that the monitorial citizen must rely almost exclusively on professional communicators to evaluate policies and interpret political events (Page 1996). If anything, then, Schudson’s evolving notion of citizenship makes understanding the role of information environment more, not less, important.
Appendix

Political Knowledge Data Series

We searched for surveys conducted by a single organization which contained questions about political knowledge and news consumption. A search of all available dates in the Roper Center for Public Opinion Research ipoll database turned up 41 surveys conducted by Princeton Survey Research Associates (PSRA) that had at least one close-ended political knowledge question as well as a measure of how closely the respondent followed that issue. Most of the 41 surveys we chose had more than one knowledge question. In these cases we randomly selected a question.

The questions we randomly selected covered a wide variety of domestic and international issues. Despite the care we took to examine questions on a variety of topics, the Kaiser Family Foundation and Harvard School of Public Health sponsored many of the surveys in our sample. As a result, several of our knowledge questions concern health related issues, although a fair

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25 The follows question generally read like this: “As I read each item, tell me if you happened to follow this news story very closely, fairly closely, not too closely, or not at all closely. How closely did you follow news stories about …?” We rejected 25 surveys because they did not contain usable knowledge-follows pairs or because they used only open-ended knowledge questions. Another 43 surveys might be candidates for analysis, but the codebooks are not available from Roper Center so we could not verify the existence of matching knowledge and follows pairs. There were no PSRA surveys in the Roper Archives for 1995. Survey organizations constantly are adding new polls so the total number of surveys in ipoll might differ from the figures we report here.
number are on domestic policy developments or foreign policy events. Table A-1 lists the question topic and correct answer for each of the surveys we use in the analysis.

Insert Table A-1 here.

The data files for the surveys used here have been archived for public dissemination at the Roper Center for Public Opinion. Detailed information on the surveys, including question wording, order, and introductions, etc., is available at the Roper Center.

Selecting News Sources

Our guiding principle in selecting sources for the content analysis was to choose outlets that provided a representative picture of the information to which citizens were exposed in the weeks prior the PSRA survey. We thought it important to include a broadcast news source because an overwhelming majority of citizens state that they rely on television for information about public affairs (Ansolabehere, Behr, and Iyengar 1993). CBS was selected randomly from the major broadcast networks. Since many people rely on some combination of print and broadcast news, we also included *USA Today*, the nation's most read daily newspaper, and the *Associated Press* newswire, which several scholars view as an agenda setter for other papers around the nation (e.g., Ansolabehere, Behr, and Iyengar 1993).²⁶

Our decision to content analyze news stories in the six weeks prior to the survey was purposive. In selecting subjects for their surveys, researchers at the Kaiser Family Foundation and the Harvard School of Public Health chose topics that had been in the news during the past

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²⁶ For a comparison of the effects of print and broadcast news, see Neuman, Just, and Crigler (1992).
six weeks (see the Health Poll Reports at www.kff.org). Our results are robust to one, two, and three week content analysis periods (see supplemental Addendum B).

**Coding the Information Environment**

The first stage of the coding process involved identifying the appropriate subset of media reports. As we describe in the text, a story was considered relevant as long as it discussed the issue underlying the knowledge question. The second stage of the coding process involved coding news stories for information regarding the expert sources and contextual information.

**Expert Commentary.** Coders identified the number of times experts were quoted or paraphrased in a news story. The following sources were coded as experts: academics, medical professionals, consultants, economists, and individuals holding positions in think tanks, the Federal Reserve, Congressional Budget Office, or Congressional Research Service.

**Contextual Information.** Contextual information provides background about why citizens should care about the issue mentioned in the question or why it “matters” (Bennett 2003). This kind of information may take a variety of forms. Articles that consider why a particular policy action has been taken or that provide an in-depth discussion of a policy problem constitute contextual information. Articles that discuss the consequences of a policy change or discuss the contents of the proposed change in detail also constitute contextual information. Articles that discuss the political consequences of a particular policy change may be considered contextual if there is a discussion about why political actors are or are not doing something (e.g., fear of electoral retribution causes a bill to die). Coders rated news reports according to the following three point scale: “0” indicates a story did not provide a rationale for why the issue is important;
“1” indicates that it provided some rationale; and “2” indicates that article provides a clear rationale for why the issue is important.

**Intercoder Reliability Analysis**

We validated the reliability of our context and source codes on a randomly selected sample (approximately 15%) of media reports. We used kappa, which is a measure of “chance-corrected” agreement (Scott 1955; Cohen 1960). Kappa is computed as:

$$\frac{P_O - P_E}{1 - P_E}$$

where $P_O$ is the observed percentage of agreement and $P_E$, the expected percentage agreement, is calculated as:

$$P_E = \sum_{i=1}^{k} P_i^2$$

The total number of categories is denoted by $k$ and $P_i$ is the proportion of the entire sample falling into the $i^{th}$ category. Because the measure takes chance agreement into account, the value of kappa will tend be lower than the correlation between two sets of scores. According to Cicchetti and Sparrow (1981), a value of kappa above .60 is good; .75 or higher is excellent. Using these guidelines, the level of agreement for our context and source codes were both good (0.67 and 0.58, respectively).
References


University of Chicago Press.

Americans’ Policy Preferences.* Chicago: University of Chicago.


Reception and Their Implications for Research.” *Public Opinion Quarterly* 57 (Summer):  
133-64.

Knowledge about the Bosnian Civil War.” *American Politics Research* 29 (November): 
592-607.

Political Science* 32 (August): 737-57.


Table 1. Knowledge About Recent Political Developments

<table>
<thead>
<tr>
<th>Subject of Question</th>
<th>% Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bush drug plan</td>
<td>4</td>
</tr>
<tr>
<td>Social Security trust fund solvency</td>
<td>20</td>
</tr>
<tr>
<td>Tobacco settlement</td>
<td>25</td>
</tr>
<tr>
<td>Patient's rights debate</td>
<td>26</td>
</tr>
<tr>
<td>Preven (&quot;morning after pill&quot;)</td>
<td>28</td>
</tr>
<tr>
<td>Insurance coverage of Viagra</td>
<td>29</td>
</tr>
<tr>
<td>Rwanda</td>
<td>31</td>
</tr>
<tr>
<td>Medical error report</td>
<td>31</td>
</tr>
<tr>
<td>Senate action on patients rights legislation</td>
<td>32</td>
</tr>
<tr>
<td>Medicare and Social Security solvency</td>
<td>32</td>
</tr>
<tr>
<td>State restrictions on abortion</td>
<td>33</td>
</tr>
<tr>
<td>Budget Agreement and Medicare</td>
<td>34</td>
</tr>
<tr>
<td>State of the Union proposal for Medicare</td>
<td>36</td>
</tr>
<tr>
<td>Size of budget deficit</td>
<td>36</td>
</tr>
<tr>
<td>Health insurance premiums</td>
<td>41</td>
</tr>
<tr>
<td>FDA announcement regarding Seldane</td>
<td>42</td>
</tr>
<tr>
<td>Price fixing by pharmaceutical companies</td>
<td>43</td>
</tr>
<tr>
<td>Cabinet nomination of Tommy Thompson</td>
<td>44</td>
</tr>
<tr>
<td>FDA announcement regarding PPA</td>
<td>45</td>
</tr>
<tr>
<td>Clinton health plan</td>
<td>47</td>
</tr>
<tr>
<td>Senate vote on partial birth abortion ban</td>
<td>48</td>
</tr>
<tr>
<td>State of the Union proposal to invest Social Security trust fund</td>
<td>48</td>
</tr>
<tr>
<td>Haiti</td>
<td>51</td>
</tr>
<tr>
<td>State of the Union proposal to fight AIDS in Africa</td>
<td>53</td>
</tr>
<tr>
<td>Senate action on campaign finance bill</td>
<td>54</td>
</tr>
<tr>
<td>Budget Agreement and Medicare</td>
<td>54</td>
</tr>
<tr>
<td>Drug discount card</td>
<td>55</td>
</tr>
<tr>
<td>Funding for stem cell research</td>
<td>55</td>
</tr>
<tr>
<td>Drug cards</td>
<td>55</td>
</tr>
<tr>
<td>Supreme Court ruling on partial birth abortion</td>
<td>61</td>
</tr>
<tr>
<td>Report from international AIDS conference</td>
<td>62</td>
</tr>
<tr>
<td>Bombing of abortion clinic</td>
<td>63</td>
</tr>
<tr>
<td>Risk factors for cervical cancer</td>
<td>65</td>
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<tr>
<td>Social Security reform</td>
<td>67</td>
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<tr>
<td>Congressional legislation on HMO's</td>
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<td>Congressional plan to means-test Medicare</td>
<td>72</td>
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<tr>
<td>California initiative regarding medical marijuana</td>
<td>73</td>
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<tr>
<td>FDA announcement regarding the diet drug Phen-fen</td>
<td>75</td>
</tr>
<tr>
<td>Gays in the military</td>
<td>78</td>
</tr>
<tr>
<td>Clinton and gun control</td>
<td>82</td>
</tr>
<tr>
<td>West Nile Virus</td>
<td>94</td>
</tr>
</tbody>
</table>

Note: Cell entries indicate the percent getting the question correct. Don't know responses were randomly assigned to a substantive response when interviewers reminded respondents of the non-response option (for more on this procedure, see Mondak 2001).
Table 2. Random Coefficients Model Predicting Citizen Knowledge

<table>
<thead>
<tr>
<th></th>
<th>Coeff.</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Effect</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.013</td>
<td>0.116</td>
</tr>
<tr>
<td>Education</td>
<td>0.070</td>
<td>6.902 ***</td>
</tr>
<tr>
<td>Income</td>
<td>0.048</td>
<td>4.733 ***</td>
</tr>
<tr>
<td>Age</td>
<td>0.004</td>
<td>3.642 ***</td>
</tr>
<tr>
<td>Female</td>
<td>-0.068</td>
<td>-1.938 *</td>
</tr>
<tr>
<td>Black</td>
<td>-0.104</td>
<td>-2.127 **</td>
</tr>
<tr>
<td>Follows issue</td>
<td>0.228</td>
<td>7.641 ***</td>
</tr>
<tr>
<td><strong>Variance Components</strong></td>
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<td></td>
</tr>
<tr>
<td>Intercept (δ₀)</td>
<td>0.770</td>
<td>***</td>
</tr>
<tr>
<td>Education (δ₁)</td>
<td>0.004</td>
<td>***</td>
</tr>
<tr>
<td>Income (δ₂)</td>
<td>0.004</td>
<td>***</td>
</tr>
<tr>
<td>Age (δ₃)</td>
<td>0.000</td>
<td>***</td>
</tr>
<tr>
<td>Female (δ₄)</td>
<td>0.054</td>
<td>***</td>
</tr>
<tr>
<td>Black (δ₅)</td>
<td>0.097</td>
<td>***</td>
</tr>
<tr>
<td>Follows issue (δ₆)</td>
<td>0.049</td>
<td>***</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-61778.9</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* Entries are full maximum likelihood estimates (HLM 5.05). $N = 45,365$.

* $p < .10$, ** $p < .05$, *** $p < .01$ (two-tailed).
Table 3. Individual and Environmental Determinants of Political Knowledge

<table>
<thead>
<tr>
<th>Environmental Factor</th>
<th>Volume of Information</th>
<th>Expert Commentary</th>
<th>Contextual Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff.</td>
<td>t-ratio</td>
<td>Coeff.</td>
</tr>
<tr>
<td>Fixed effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.003</td>
<td>-0.033</td>
<td>-0.004</td>
</tr>
<tr>
<td>Education</td>
<td>0.073</td>
<td>7.730 ***</td>
<td>0.073</td>
</tr>
<tr>
<td>Income</td>
<td>0.050</td>
<td>5.084 ***</td>
<td>0.051</td>
</tr>
<tr>
<td>Age</td>
<td>0.004</td>
<td>3.731 ***</td>
<td>0.004</td>
</tr>
<tr>
<td>Female</td>
<td>-0.072</td>
<td>-2.007 **</td>
<td>-0.070</td>
</tr>
<tr>
<td>Black</td>
<td>-0.110</td>
<td>-2.233 **</td>
<td>-0.112</td>
</tr>
<tr>
<td>Follows Issue</td>
<td>0.237</td>
<td>8.042 ***</td>
<td>0.239</td>
</tr>
<tr>
<td>Random intercepts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item Difficulty</td>
<td>-1.238</td>
<td>-2.794 ***</td>
<td>-1.276</td>
</tr>
<tr>
<td>Volume</td>
<td>0.019</td>
<td>2.210 **</td>
<td>0.024</td>
</tr>
<tr>
<td>Expert</td>
<td>0.171</td>
<td>0.875</td>
<td>0.033</td>
</tr>
<tr>
<td>Context</td>
<td>-0.004</td>
<td>-1.213</td>
<td>-0.004</td>
</tr>
<tr>
<td>Random slopes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education × Env'l Factor</td>
<td>0.002</td>
<td>3.118 ***</td>
<td>0.029</td>
</tr>
<tr>
<td>Income × Env'l Factor</td>
<td>0.001</td>
<td>2.388 **</td>
<td>0.030</td>
</tr>
<tr>
<td>Age × Env'l Factor</td>
<td>0.000</td>
<td>0.051</td>
<td>-0.002</td>
</tr>
<tr>
<td>Female × Env'l Factor</td>
<td>0.000</td>
<td>0.055</td>
<td>0.079</td>
</tr>
<tr>
<td>Black × Env'l Factor</td>
<td>-0.004</td>
<td>-1.109</td>
<td>-0.106</td>
</tr>
<tr>
<td>Follows Issue × Env'l Factor</td>
<td>0.004</td>
<td>1.799 *</td>
<td>0.156</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-60990.9</td>
<td></td>
<td>-61031.7</td>
</tr>
</tbody>
</table>

Note: Entries are full maximum likelihood estimates (HLM 5.05). N = 45,365.
* p < .10, ** p < .05, *** p < .01 (two-tailed).
### Table A-1. Political Knowledge Questions and Answers

<table>
<thead>
<tr>
<th>Survey</th>
<th>Factual Question</th>
<th>Answer</th>
<th>Survey Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Can states restrict abortion in the first trimester</td>
<td>They can after <em>Casey</em> decision</td>
<td>April 30-May 3, 1992</td>
</tr>
<tr>
<td>2</td>
<td>Clinton's policy on gays in the military</td>
<td>Don't ask, don't tell</td>
<td>July 29-August 1, 1993</td>
</tr>
<tr>
<td>3</td>
<td>Clinton administration health care plan</td>
<td>Workers guaranteed coverage</td>
<td>December 2-5, 1993</td>
</tr>
<tr>
<td>4</td>
<td>How many killed in Rwandan massacre</td>
<td>Approximately 250,000 killed</td>
<td>May 12-15, 1994</td>
</tr>
<tr>
<td>5</td>
<td>U.S. intervention in Haiti</td>
<td>American forces killed Haitians</td>
<td>October 6-10, 1994</td>
</tr>
<tr>
<td>6</td>
<td>California Proposition 215 on marijuana</td>
<td>Allowed use in medical situations</td>
<td>December 13-17, 1996</td>
</tr>
<tr>
<td>7</td>
<td>Congressional proposals on Medicare</td>
<td>Require upper income seniors to pay more</td>
<td>August 7-10, 1997</td>
</tr>
<tr>
<td>8</td>
<td>Size of budget deficit relative to five years prior</td>
<td>Decreased</td>
<td>August 7-10, 1997</td>
</tr>
<tr>
<td>9</td>
<td>Why was Phen-Fen taken off the market</td>
<td>It caused heart valve problems</td>
<td>October 17-21, 1997</td>
</tr>
<tr>
<td>10</td>
<td>Main reason for reforms for Social Security</td>
<td>Projected funding problems in 30 yrs.</td>
<td>April 17-27, 1998</td>
</tr>
<tr>
<td>11</td>
<td>Tobacco Settlement</td>
<td>Right to sue not part of the settlement</td>
<td>December 8-13, 1998</td>
</tr>
<tr>
<td>12</td>
<td>Clinton proposals on Social Security</td>
<td>Government investment in stocks</td>
<td>February 19-25, 1999</td>
</tr>
<tr>
<td>13</td>
<td>Report on financial condition of Social Security</td>
<td>Run out of money later than expected</td>
<td>April 10-22, 1999</td>
</tr>
<tr>
<td>14</td>
<td>Nat'l Academy of Sciences on hospital errors</td>
<td>New gov't agency to protect patients</td>
<td>December 3-13, 1999</td>
</tr>
<tr>
<td>15</td>
<td>Clinton State of the Union Address 2000</td>
<td>Proposed lowering Medicare to age 55</td>
<td>February 4-8, 2000</td>
</tr>
<tr>
<td>16</td>
<td>FDA warning about PPA and medications that include it</td>
<td>Cold and cough medicines</td>
<td>Nov. 29-Dec. 3, 2000</td>
</tr>
<tr>
<td>17</td>
<td>Patient's rights legislation</td>
<td>Patients can sue health plans</td>
<td>May 31-June 3, 2001</td>
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<td>19</td>
<td>Action on prescription drug discount cards</td>
<td>Private company creates card program</td>
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<td>20</td>
<td>Action to provide relief on prescription drugs</td>
<td>Private company creates card program</td>
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<td>21</td>
<td>FDA action on allergy drug Seldane</td>
<td>Steps to remove seldane from shelves</td>
<td>February 22-24, 1997</td>
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<td>22</td>
<td>Balance budget agreement and Medicare</td>
<td>Proposal to increase Medicare premiums</td>
<td>June 18-22, 1997</td>
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<td>23</td>
<td>Bombing of abortion clinic in Alabama</td>
<td>Someone was killed</td>
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<td>24</td>
<td>Insurance coverage for Viagra versus birth control</td>
<td>Companies more likely to cover Viagra</td>
<td>June 12-18, 1998</td>
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<td>25</td>
<td>Congressional action on patients rights</td>
<td>Congress has yet to take any action</td>
<td>August 6-20, 1998</td>
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<td>26</td>
<td>How does Preven work</td>
<td>Prevents a pregnancy from occurring</td>
<td>October 10-18, 1998</td>
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<td>27</td>
<td>Pharmaceutical companies and price fixing</td>
<td>Pled guilty to vitamin price fixing</td>
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<th>Answer</th>
<th>Survey Period</th>
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<td>It was passed in the Senate</td>
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<td>Called for background checks at shows</td>
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<td>States do not have right to outlaw</td>
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<td>Employer premiums for health insurance</td>
<td>Risen faster than in previous years</td>
<td>Sept. 29-Oct. 2, 2000</td>
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<td>Cabinet nomination of Tommy Thompson</td>
<td>Nominated for Secretary of Dept. of HHS</td>
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<td>Senate action on the McCain-Feingold bill</td>
<td>Senate passed the bill</td>
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<td>Increase U.S. funding for AIDS in Africa</td>
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<td>41</td>
<td>Senate action on partial-birth abortion ban</td>
<td>Voted to pass the bill</td>
<td>April 3-6, 2003</td>
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Note: Complete question wording, including response options, can be obtained from the Roper Center Archive. All surveys are separate cross-sections even though dates may overlap.
Figure 1. How the Volume of Information and Expert Commentary Magnifies the Effects of Education and Income on Knowledge

**Panel A**

- Low volume in the environment
- High volume in the environment

**Panel B**

Education

- Low
- High

**Panel C**

- Low expert commentary in the environment
- High expert commentary in the environment

**Panel D**

Income

- Low
- High

Percent Correct

- 30
- 50
- 70

- Low
- High

- Low
- High
Figure 2. How Contextual Coverage Moderates the Effects of Income and Age on Knowledge

**Panel A**

![Graph showing the effect of income on knowledge with different contextual cues](image)

**Panel B**

![Graph showing the effect of age on knowledge with different contextual cues](image)

- **Few contextual cues in the environment**
- **Many contextual cues in the environment**