

Visual Political Knowledge

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Abstract

Even though visual images and television are ubiquitous in American politics, surveys rarely use visuals to assess what people know about politics. I measure visual political knowledge in a series of experiments that ask otherwise identical questions using either visual elements or words only. These experiments were embedded in a representative survey of 1,650 U.S. residents. On average, respondents do equally well on visual and verbal knowledge questions, and both types of knowledge measure civic competence equally well. Visual and verbal political knowledge, however, have different origins. Verbal knowledge, here and in past studies, is lower among women, minorities, and less educated people. None of these differences emerge for visual knowledge. Instead, attitudes about the political process, such as civic duty and strength of partisanship, are important in explaining visual political knowledge. These differences are consequential, as visual political knowledge is a significantly stronger predictor of turnout than verbal knowledge.

Visual Political Knowledge

“I can see his face and his balding head, but I can't remember his name. The name just doesn't come to me.”

“I can see his face but I can't remember his name, bad with names, real bad.”

Respondents 10640 and 15223, asked to name George W. Bush's Supreme Court nominee (Samuel Alito), phone survey conducted by Indiana University's Center for Survey Research for Time-sharing Experiments for the Social Sciences (TESS), Nov. 4 and Nov. 9, 2005

Visuals are everywhere in American politics. Everyday, more people watch television news than read a paper or listen to news on the radio. Producers of political ads help candidates present their faces in the most favorable light and from the most attractive angle. A reliable way to receive public attention is to stage a good ‘photo-op.’ One content analysis estimated that a typical TV news story contains almost 70 different visual images per 1,000 words (Neuman, Just, and Crigler 1992). Accounting for the brevity of stories on television, this translates into an average of 24 images in a 2 1/2-minute story. Graber (1990) found that about a third of all visuals in a typical newscast add completely new information to a story.

Despite this omnipresence of visuals, survey researchers hardly ever ask about visuals when they measure what people know about politics.¹ Due to the ease of conducting Internet surveys, this is slowly beginning to change. Time-sharing Experiments for the Social Sciences (TESS) and the 2006 Cooperative Congressional Election Study (CCES) have used visuals. Respondents in the

¹ Visual recognition measures have been used in experimental research (Masters and Sullivan 1993; Masters et al. 1986; Sullivan 1996; Sullivan and Masters 1988). Political scientists have studied the effects of nonverbal cues on attitudes. Roger Masters and Denis Sullivan (Keating, Randall, and Kendrick 1999; Rosenberg et al. 1986; Rosenberg, Kahn, and Tran 1991) have conducted a series of experiments on the impact of politicians' facial expressions on the emotional responses that their appearances elicit. Other studies have shown that people are more likely to prefer physically attractive candidates (Bailenson et al. 2006) and similar looking candidates (2001).

2008 National Election Study (NES) will answer questions on laptop computers. But although political knowledge questions with visual elements are bound to become more common, we know little about their properties and how they compare to traditional verbal knowledge measures.

One potential conclusion from measuring visual political knowledge would be truly radical: People may know a lot more than verbal measure indicate if their knowledge is predominantly processed and encoded visually. The numerous studies documenting people's poor political knowledge (e.g., Bennett 1995; Converse 1964; Delli Carpini and Keeter 1996; Gilens 2001) may have reached their conclusions only because they never asked about the political world that people *see* on television or in press photographs. Less radical, but equally important is the possibility that the verbal bias hurts some respondents more than others and thus distorts conclusions about how knowledge matters. Scholars of cognitive and educational psychology distinguish "visualizers" and "verbalizers" (e.g., Paivio 1971; 1986; Richardson 1977). According to theories of mental representation and information processing, people differ in their symbolic habits and abilities. Some people prefer to learn and think visually, whereas others favor a verbal cognitive style. Visualizers could be disadvantaged because the instruments used to assess political knowledge are exclusively verbal or because questions typically cover the kind of political information that mass media present primarily in verbal form. Measurement of visual political knowledge could reveal "mode publics"—groups of people whose political knowledge in one mode of communication clearly exceeds their knowledge in another mode, much like Converse's (1964) "issue publics" are more likely to know about 'their' political issue than about other issues.

This paper reports the results of the first nationally representative survey to measure visual political knowledge. One half of the respondents answered a series of knowledge questions with visual elements. The other half received identical questions, except that words replaced the visuals. This experimental design allows me to compare average levels of visual and verbal political knowledge and to compare their origins and consequences. In the next section, I derive five hypotheses about visual knowledge from research on information processing and political

knowledge. After describing the experimental design, I evaluate the hypotheses empirically. I also analyze if visual political knowledge affects political behavior in different ways than verbal political knowledge, focusing on turnout as an example. The concluding section argues that visual knowledge is a distinct and important element of political cognition and discusses several central questions for future research.

Theory

Survey-based studies on the measurement of political knowledge and research on its causes and consequences have so far focused exclusively on verbal knowledge (e.g., Delli Carpini and Keeter 1993; Luskin 1987; 1990; Mondak 2000; 2001). Yet, psychological models of how people encode and store information suggest that concentrating exclusively on verbal knowledge may distort conclusions. Processing visual information appears to happen automatically and require fewer resources than verbal information (Grimes 1991; Lang 1995; Lang, Potter, and Bolls 1999).

According to Paivio's (1971; 1986) dual coding theory, knowledge can be represented visually or verbally as "any given stimulus can be encoded using one of two symbolic systems: the verbal system which is essentially linear and most suitable for dealing with language and abstract, sequential relationships; and the imaginal system, which specializes in dealing with nonverbal and concrete parallel relationships" (Fogarty and Burton 1996, 87). Dual coding theory suggests at least two reasons why people's performance on visual political knowledge questions might differ from their performance on traditional all-verbal questions.

First, television is the main source of political information for the majority of Americans. It presents a considerable amount of non-redundant political information visually. Using mostly focus groups and experiments, Doris Graber (1988; 1990; 2001) has demonstrated that viewers recall visual themes presented in TV news at least as easily as verbal themes. Not asking about visual information thus generates biased estimates of political knowledge: "Even though people would score well on such questions because they remember visual information better than verbal data,

they are seldom asked about the content and meaning of pictures seen on television” (Graber 2001, 52).

The second reason why people might do better on visual knowledge questions has to do with the way information is processed and retrieved. Even for content that is presented both verbally and visually (either in the same or in different media), comprehension, encoding, and later retrieval of the visual information may be easier (Lang 1995). Respondents may answer a verbal knowledge question incorrectly not because they do not know the answer, but because they processed and stored the information in visual form. They may, like the two TESS respondents in the epigraph to this paper, remember the face of a Supreme Court nominee but not his name. In that case, it would be mistaken to declare them politically ignorant. When visual and verbal stimuli compete for scarce mental capacity—as when the video and audio tracks of TV news offer non-redundant information—visual information is more likely to be encoded and stored in memory (Grimes 1991; Lang 1995; Lang, Potter, and Bolls 1999).

Hence, according to my *first hypothesis*, people are more likely to respond correctly to the visual versions of otherwise identical questions. This proposition can be tested against two alternative hypotheses. The null hypothesis is that modality does not make any difference—people either store visual *and* verbal representations of the information or they store no information at all. According to a weaker version of the first hypothesis, modality differences depend on the content of the question, so that for some questions performance is higher in the visual format, for others in the verbal format.

Individuals differ in how much information they desire, where they get their political information, and how they process visual and verbal information. Relying only on verbal measures of political knowledge can therefore disadvantage certain people disproportionately. Dual coding theory (Paivio 1971; 1986) stipulates that people’s preferences for information processing influence which symbolic system is used. Some people like to learn verbally, by reading or listening, while others prefer visual information, such as graphs, diagrams or pictures (Kirby,

Moore, and Schofield 1988; Plass et al. 1998). My *second hypothesis* proposes that people with a visual cognitive style do worse on verbal political knowledge tests than on visual tests.

Although processing styles often correspond to cognitive abilities, this relationship is not deterministic as “one might be a habitual ‘imager’ . . . without necessarily being proficient in a cognitive task that depends on the use of imagery, or a verbal thinker without scoring high on tests of language ability” (Paivio 1986, 99). Cognitive abilities may thus have an effect on knowledge independent of cognitive style. Graber (1996, 86) has argued that education is important in teaching people to understand verbal information, but not visual information: “Skill in processing verbal information, particularly when it is printed and deals with complex matters, often requires formal schooling. Audiovisual information transmission, therefore, can potentially reach much larger audiences, starting at a much younger age.” Hence, a visual knowledge question may be easier to answer for less educated respondents than a verbal question because they are more likely to have processed and stored the relevant information visually. According to my *third hypothesis*, education is more strongly related to verbal political knowledge than to visual political knowledge. Previous research offers a competing hypothesis: Education is related to political knowledge because it exposes students to information about the political process and trains them to understand the complexities of politics (e.g., Jennings 1996; Nie, Junn, and Stehlik-Barry 1996; Niemi and Junn 1999). The more educated should thus score better on visual and verbal knowledge tests alike.

Cognitive style and abilities are likely to influence where people turn for political information. But even holding constant differences between visualizers and verbalizers as well as differential cognitive abilities and education, people who get a lot of their political information from visual media may do relatively better on the visual knowledge test (*fourth hypothesis*).

There are no compelling theoretical reasons to expect several other important predictors of political knowledge to operate differently for visual knowledge. Interest in politics, a sense of civic duty, and political efficacy explain why some individuals devote time to following politics rather than other activities (e.g., Bennett 1995; Delli Carpini and Keeter 1996; Jennings 1996; Luskin

1990; Smith 1989). Whether or not these variables predict visual and verbal knowledge equally well is an empirical question.

Two different types of reasons could explain why independent variables affect knowledge scores differently for visual than for verbal questions. People may differ in how often they encounter, how they process, or whether they store visual and verbal information about the question topics (learning effects). Alternatively, modality effects could emerge because people approach a question with visuals differently than a fully verbal question (interview effects). For example, more educated respondents may have an advantage on verbal questions because they process and store more verbal political information (learning effect) or because the verbal question itself is easier for them (interview effect). According to the UN Human Development Report 2002, 21 percent of Americans between the age of 16 and 65 are functionally illiterate. Although even the visual question format used in this study contained words, it may reduce the disadvantage for these respondents. More generally, education increases familiarity and experience with verbal test questions. Visuals might reduce test-taking effects and encourage less educated respondents to consider the question.

Guessing on political knowledge is a well-known interview effect (Mondak 2001; Mondak and Davis 2001; Nadeau and Niemi 1995). Respondents who guess when they are not sure of the answer to a knowledge question (rather than select “Don’t Know”) do better. The propensity to guess is unevenly distributed across the population and creates individual-level differences on knowledge tests that are unrelated to the amount of information held in memory. To the extent that visual elements encourage substantive responses, factors associated with the propensity to guess should matter less for visual knowledge questions. Mondak and Anderson (2004) have demonstrated that a substantial part of the gender gap in political knowledge emerges because women are less likely to guess and therefore do worse on knowledge tests. If visual question formats encourage women to guess, visual political knowledge might reduce the gender gap for measurement reasons. But women are also generally better than men at recognizing faces (Lewin

and Herlitz 2002), so they might benefit disproportionately from visual questions because they hold more visual information in memory. Both of these arguments motivate my *fifth hypothesis*: Gender differences are smaller on visual political knowledge tests than on verbal tests.

Data and Experimental Design

To compare the distributions and correlates of visual and verbal political knowledge, I conducted a series of experiments that asked respondents the same set of multiple-choice knowledge questions, but randomly varied whether the questions were represented verbally or visually. In the visual condition, questions asked about individuals shown by photographs. In the verbal condition, questions were identical except that they referred to individuals by name rather than picture. This manipulation varies modality without changing the substance of the question. As close-ups are by far the most common visuals in news stories (Graber 1990), it captures a visual format that many people encounter frequently. The experiments were embedded in a representative opinion survey (see below), so the results can be generalized to the U.S. population.

I designed four different types of visual-verbal experiments. The “Which office...” design asked respondents to name the office or position held by an individual identified either by name or by a photograph. One question in this format asked respondents about Alan Greenspan’s job. In the verbal condition, the question was “What position is currently held by Alan Greenspan?” In the visual condition, the question asked instead “What position is currently held by the person shown in this picture?” The response options for the question were the same in both conditions (and presented in random order). Figure 1 illustrates the experimental design with screenshots for both conditions. The experiments randomly varied between three different photographs of the same person in an attempt to minimize the impact of any particular photograph.

(Figure 1 about here)

In a second question design, the “Who is...” design, respondents were asked which politician holds a particular office. The response options for those in the verbal condition consisted of the names of four figures of public interest, while respondents in the visual condition chose between

the photographs of the same four individuals. For example, one question asked, “Who is the current Senate majority leader?” The response options for people in the verbal condition were “Bill Frist,” “Trent Lott,” “Dick Gephardt,” and “John Kerry.” In the visual condition, respondents saw photographs of these four politicians instead of their names. Figure 2 shows the screenshots for both conditions.

(Figure 2 about here)

The interview included three questions of the “Which office...” design and three questions of the “Who is...” design. A third design asked four knowledge questions on one survey screen using a response grid. Respondents were asked to indicate the party of four politicians identified either by name or by photograph. The politicians were Tom Daschle, Christine Todd Whitman, Howard Dean, and Ralph Nader. The response options were “Republican,” “Democrat,” “Green Party,” and “Reform Party.”

In a fourth design, respondents were asked to mark all correct answers (out of four) in response to a question (“Check all” design). For example, one question asked “Which of these politicians has/have announced they will run for the Democratic nomination for President in 2004?” The response options were Joe Lieberman, Hillary Clinton, Al Gore, and John Edwards (represented either by their names or pictures), and respondents could place a check mark next to each one of them. Answers to this question type were scored by subtracting the number of incorrectly checked response from the number of correctly placed check marks. Adding two to the

result yields a score for each respondent between 0 and 4. Two questions in this format were included in the interview.²

The four experimental designs cover a variety of different types of associations between mental representations of political information. Designs 1 and 3 ask respondents to identify different attributes of politicians (their positions, their party affiliation). Design 2 asks respondents to select which of four different politicians fits a particular attribute. Design 4 varies that task by allowing more than one answer. Together, the questions, listed in Table 1, cover all three branches of government as well as the Federal Reserve and a prominent third party.

(Tables 1 and 2 about here)

The survey design followed Mondak's (2001; Mondak and Davis 2001) recommendation to discourage "Don't Know" responses by not giving respondents an explicit "Don't Know" option for each question, but only instructing them on the first screen of the knowledge battery that they could go to the next question if they "really don't know the answer." Combining all questions in the four experimental designs yields a 19-point knowledge index. Each respondent was assigned to either the visual or the verbal condition for all questions, so the interview yields a measure of visual political knowledge for one half of the sample and of verbal knowledge for the other half.

² This design treats guessing differently than the first three designs, which reward guessing (because random guessing yields the correct answer with a 25 percent chance) and thus penalize respondents who refuse to respond to the question. The "Check all" design is more symmetric since it penalizes those who guess 'too much' in a similar fashion as those who do not guess 'enough'. By subtracting incorrectly checked responses from the number of correctly checked response, this design assigns the same score to respondents who check all four responses and to respondents who do not check any. (Equivalently, checking three rather than one response does not increase the expected score either.)

The experiments were included in a survey of 1650 randomly selected U.S. residents. It was conducted by Knowledge Networks in April of 2003. Knowledge Networks interviews national probability samples of the U.S. population over the Internet by providing a large panel, selected through Random Digit Dialing, with WebTV units and free Internet connections in exchange for taking surveys. The participants for this study constitute a randomly selected subset of the KN panel and are thus close to a random sample of the U.S. adult population.³

Results

Comparing the Two Distributions

To investigate if estimates of political knowledge change when an otherwise identical question is asked using visual elements rather than only words, I compare the percentage of correct answers in the visual and the verbal experimental conditions. Tables 1 and 2 show the distributions of answers to each of the 12 knowledge questions separately for the two conditions. On three items (Rice, Fleischer, and Whitman), the number of correct answers is indeed significantly higher in the visual condition. Yet on two other items (Rehnquist and Daschle), the opposite is true. And for the majority of items, performance does not differ in the two conditions. Comparing the distributions

³ The knowledge experiments were included in the second of two survey waves. The first wave was conducted in March 2002. The household cooperation rate during the period of the two surveys was 53%. The survey completion rate for the first wave was 85%. Of the original 2358 respondents interviewed in the first wave, the 1957 who were still part of the Knowledge Networks panel in April 2003 were contacted again. Of these, 1650 panelists were re-interviewed, generating a reinterview rate of 84%. For details on the sampling mechanism used by Knowledge Networks, see Krotki and Dennis (2000); for a comparison to other web survey methods, see Couper (2001). In a comparison of KN data to an RDD telephone survey, Krosnick and Chang (2001) found the KN sample to be representative of the U.S. population in terms of demographics and political attitudes.

of correct, incorrect, and “Don’t Know” (DK) responses (instead of just correct versus not correct) does not change this conclusion.

These results are inconsistent with the strong version of the first hypothesis: People are not systematically more likely to respond correctly to the visual versions of otherwise identical questions. But there is sufficient evidence to reject the null hypothesis that modality is inconsequential for each and every question. By chance alone, the experimental manipulation should produce significant effects for less than 1 of the 12 questions. In fact, significant differences emerge for 5 questions. Hence, the study supports the weaker version of the first hypothesis: modality matters, but the direction of the effect depends on the question topic.

Two of the largest differences between visual and verbal condition emerge on the Fleischer and Rehnquist items. Respondents were more likely by twenty percentage points to know that Ari Fleischer was (at the time of the study) the White House press secretary when shown his picture rather than his name. Given that Fleischer was literally the “public face” of the Bush administration and probably on television more often than any other administration official, this large difference is not surprising. Similarly, the fact that people were better at identifying Rehnquist as chief justice from a set of names (of Supreme Court justices) than a set of pictures corresponds to the frequency with which Rehnquist appeared in public or on television.

While some items are easier in the visual condition, others in the verbal condition, the selection of items for this study produced additive scales with almost identical means and variances in the two conditions. The average score for respondents in the verbal condition is 9.31 with a standard deviation of 4.24, compared to 9.40 (s.d. = 4.17) in the visual condition. The average number of DK responses for the first three experimental designs (in which blank responses can be interpreted as DK’s) was also indistinguishable for the two experimental conditions. In both conditions, respondents on average did not select any response option on 2.2 of the 10 items. At least for the type of political knowledge that can be represented both visually and verbally, using visuals does not increase estimates of political knowledge.

Validating Visual Knowledge

Thanks to past research, we have some confidence that political knowledge scales capture a central element of more general civic competence. More knowledgeable people are more likely to think consistently about politics, to go to the polls, to vote in accordance with their issue stances, to participate more generally, and to be more tolerant (e.g, Delli Carpini and Keeter 1996; Neuman 1986; Verba, Schlozman, and Brady 1995). The purpose of this section is to determine if visual political knowledge, too, is linked to civic competence. Despite the remarkably similar distributions of responses in the two experimental conditions, it remains to be seen if those who do well on the visual measure are in fact “competent.” I compare visual and verbal knowledge to other measures of civic competence: performance on political knowledge questions that were not part of the experiment and the extent to which people’s party identification reflects their positions on salient political issues.

First, I examined the relationship between the knowledge indices in the two experimental conditions and performance on other (verbal) knowledge items included in the same format for all respondents. Two different knowledge measures were created: (1) knowledge of “taught” facts (Delli Carpini and Keeter 1991), that is, the organization and procedures of American government; and (2) knowledge of “surveillance” facts, i.e., “facts that change frequently and so require surveillance on the part of citizens” (Delli Carpini and Keeter 1991, 598).⁴

No significant differences between the two experimental conditions emerged in the strength of the association with the validation measures. The Pearson correlations were .52 (verbal condition) and .49 (visual condition) for taught facts, and .57 (verbal) and .56 (visual) for surveillance facts.

⁴ The “taught” items are identical to or based on items from Delli Carpini and Keeter’s recommended knowledge index. Their questions on overturning a presidential veto and the maximum number of presidential terms are open-ended, whereas this survey used a multiple-choice format. For questions and descriptive statistics, see appendix.

Regressing the two criterion variables on the 19-point knowledge scale, a dummy for the experimental condition, and the interaction between those two variables yields insignificant interaction terms ($t = -.36$ for surveillance and $t = -.81$ for taught knowledge). Visual and verbal knowledge do equally well in predicting performance on other knowledge questions.

A second validation criterion used in the past is the extent to which people's positions on different political issues translate into what Delli Carpini and Keeter (1996, 252) have called "instrumentally rational partisanship." If a respondent holds conservative positions on most or all political issues, political logic would dictate that she identify with the Republican party and describe herself as a conservative. To the extent that this type of internal consistency is considered a sign of civic competence—and there is some controversy on this point (see Kuklinski and Quirk 2002; Kuklinski, Quirk, and Jerit 2001; Luskin 1987)—it can be used to validate knowledge measures. Following Delli Carpini and Keeter's approach, I calculated factor scores from a set of six policy issues to measure their conservatism.⁵ I then examined the relationship between conservatism and people's reported party identification. As expected, more knowledgeable respondents were significantly more likely to identify with the party that represents the ideology implied by their issue positions. This relationship was equally strong in the two experimental conditions, indicating once again that visual and verbal political knowledge are equally indicative of competent political reasoning. This finding is confirmed when ideological self-placement is used as the dependent variable instead of party identification. In sum, several different validation

⁵ Respondents were asked to report their support for abortion, gay marriage, tax cuts, government guarantees of equal opportunity for blacks and whites, environmental protection, and gun control. In a principal components factors analysis, the first factor explained 32 percent of the variance. The eigenvalue for the second vector barely exceeded one, suggesting that the one-factor model used by Delli Carpini and Keeter is acceptable. Results hold when social and economic issues are analyzed separately.

analyses suggest that visual political knowledge is just as good a measure of civic competence as verbal knowledge.

The Sources of Visual and Verbal Political Knowledge

Having successfully validated visual political knowledge, it comes important to know if some people are more (or less) knowledgeable than verbal measures reveal. Hypotheses 2 to 5 cover such individual differences. To evaluate them, I regress the 19-point political knowledge index on a set of independent variables and test for significant differences between experimental conditions.

To measure respondents' learning style, I draw on research in cognitive and educational psychology (Kirby, Moore, and Schofield 1988; Mayer and Massa 2003; Specht and Martin 1998). The scale, the creation of which is described in detail in the appendix, distinguishes between "visualizers" who prefer a visual learning style and "verbalizers" who are more comfortable with verbal learning. High values indicate a more visual style. To assess the modality of respondents' preferred news, they were asked whether they "typically get most of [their] news from print media, from the radio, or from television?" I use a dummy for respondents who selected television or streaming online video.⁶ Following previous work on political sophistication (Bennett 1995; Luskin 1990; Neuman, Just, and Crigler 1992), I include a measure of cognitive skills. The measure, adopted from the General Social Survey, consists of 10 items that ask respondents to select synonyms for different words (see Verba, Schlozman, and Brady 1995, 561-2). Vocabulary tests are sometimes interpreted as indicative of general cognitive abilities. Neuman et al. (1992, 137) "found them particularly apt for measuring the capacity to understand news coverage." The

⁶ The four response options for this question were "Print media (newspapers, magazines, online newspapers)" (22%), "Radio (radio news, talk radio, streaming audio news via the Internet)" (13%), "Television (newscast, news magazines, streaming video news via the Internet)" (63%), and "I get my news from other sources" (2%).

other variables in the model are education, political interest, political efficacy⁷, sense of civic duty⁸, strength of partisanship, gender, race, income, and age. All analyses exclude 34 respondents whose first language is not English. While visual elements might help non-native speakers in particular, my analysis is focused on the difference between visual and verbal measurement of knowledge that emerge even among native speakers.

(Table 3 about here)

The results in Table 3 support the second hypothesis, according which visualizers do worse on verbal, but not on visual knowledge items. The measure of visual-verbal learning style has a significant negative effect in the verbal condition. A respondent who is one standard deviation above the mean on learning style (i.e., a visualizer) misses almost one question more than an otherwise identical respondent who is a standard deviation below the mean. This is about the same effect as the difference between a politically uninterested respondent and one who is “somewhat interested.” In the visual condition, learning style does not matter: Visualizers perform just as well as verbalizers. The regression coefficients in the two experimental conditions are statistically different at $p < .05$.

⁷ Political efficacy is measured by three statements: “Sometimes politics and government seem so complicated that a person like me can't really understand what's going on,” “Public officials don't care much what people like me think,” and “People like me don't have any say about what the government does.” Agreement with these statements is averaged and reversed to range from 0 (low efficacy) to 3.

⁸ The civic duty measure is average agreement with the following four items: “It is my duty as a citizen to follow the news,” “If my friends do not care to get information about politics, that's fine with me” (reversed), “Not following the news even if I have the time to do so makes me feel guilty,” and “Everyone should know about the important political issues of the day.”

In most previous research, education is strongly related to political knowledge. In fact, according to the most comprehensive study to date, “education is the single strongest predictor of political knowledge” (Delli Carpini and Keeter 1996, 271). Table 3 confirms this finding for the verbal condition. The difference between a respondent who did not finish high school and a college graduate is 2.3 points on the verbal knowledge scale. In the visual condition, in contrast, education is not significantly related to political knowledge at all. The difference between the education coefficients in the two conditions is significant at $p < .05$. Hence, my third hypothesis is supported. The evidence is consistent with Graber’s (1996) claim that comprehension of visuals requires less formal schooling.

Performance on the vocabulary test is a strong predictor of knowledge regardless of modality. In both conditions, one standard deviation on the vocabulary test translates into a difference of one correct knowledge question. Whether the vocabulary test is taken as a measure of verbal ability or of more general cognitive skill, it shows that visual knowledge, just like verbal knowledge, is higher among those with some basic skills. By holding constant these skills, it also sharpens the meaning of visual-verbal style as a measure of preference, not ability.

According to my fourth hypothesis, people who typically get their news from television benefit from the visual format of knowledge questions. Empirical analysis clearly rejects this hypothesis. Respondents who indicated television as their typical news source did no better or worse than others, regardless of the question format. Exclusion of other control variables did not alter this conclusion. The notion that people who rely heavily on television for their political information are more likely to remember visuals has so much intuitive appeal that additional research should be conducted before it is entirely dismissed. The measure I use to identify news viewers is too coarse to yield a final verdict. Drawing more heavily on self-reported media use risks problems due to the low validity of those measures, but produces at least suggestive results. The bivariate relationship between people’s self-reported television news exposure and political

knowledge is significantly stronger in the visual condition ($p=.086$). Yet this difference disappears once the other variables are included.

Women are less politically knowledgeable, according to almost all previous studies of this subject. On the verbal knowledge scale, this gender gap emerges again. Women's scores are 1.8 points lower than men's. Gender thus has about the same effect as strong political interest or a two-standard-deviation difference in cognitive skill. In the visual condition, the gender difference disappears completely. Hypothesis 5 is strongly supported. In light of a long line of research documenting a substantial gender gap on political knowledge, the absence of such a gap on visual political knowledge is remarkable. It questions whether gender differences on verbal knowledge really "reflect a genuine difference in the taste for politics" (Verba, Burns, and Schlozman 1997, 1064, 1070) and exist because "politics is still very much a man's world" (Gidengil et al. 2006, 246). If those things are true, why are women just as likely as men to recognize politicians? Below, I examine possible reasons for the missing gender gap on visual knowledge.

Another recurring finding in political knowledge research is the difference between white Americans and minorities. As in many past studies, minorities do worse than whites in the verbal condition. The difference is about one knowledge item. In the visual condition, in contrast, minorities do just as well as white respondents.

Three other variables had different effects in the two experimental conditions that were not predicted by my theoretical framework. Whether or not respondents consider it a civic duty to be informed about politics matters more for visual than verbal political knowledge. One standard deviation on civic duty adds about two thirds of a correct knowledge question in the visual condition, but less than half as much in the verbal condition. Strength of partisanship, too, is a stronger predictor of visual knowledge. The knowledge difference between independents and strong partisans is negligible in the verbal condition, but about .8 points in the visual condition. Political interest, finally, explains verbal knowledge better than visual knowledge. The difference is only significant for medium levels of interest, however.

Why do knowledge differences between visualizers and verbalizers, between men and women and between more and less educated respondents disappear in the visual condition? Two different classes of explanations are conceivable, learning effects (if people encounter and process visual information differently) and interview effects (if respondents approach survey questions with visual elements differently). Although comprehensive resolution requires additional research, I examine if the experimental manipulation affects guessing—the most prominent interview effect in the realm of political knowledge. Mondak (2000; 2001) has shown that people differ in their propensity to offer substantive answers to knowledge questions. Personality traits such as self-confidence or risk-taking may affect the propensity to guess. But so might modality. To test this, I draw on the logic and method developed by Mondak (2000), according to which guessing is associated with independent variables that do not have the same effect on the likelihood of giving incorrect and DK responses. Using a grouped multinomial logit (MNL) model, Mondak finds that differences in the propensity to give a substantive response explain the effects of several predictors of knowledge.⁹ For example, if men and women were equally likely to guess, the logit coefficient for the gender effect on the probability of responding incorrectly rather than correctly should be statistically indistinguishable from that on the probability of responding DK rather than incorrectly. It is not (Barabas 2002; Mondak 2000, 69). Relative to men, women are significantly more likely to give DK than incorrect answers.

The upper half of Table 4 confirms this result for the verbal condition in this study. The dependent variable in Table 4 is performance in the first three experimental designs. The fourth (“Check all”) design cannot be used here because it does not distinguish incorrect from DK responses (see fn. 2). For the OLS model in Table 4, the dependent variable is the sum of correct responses to the 10 knowledge questions. In the grouped MNL model, the dependent variable is the

⁹ Nadeau and Niemi (1995) also use MNL to distinguish predictors of correct, incorrect, and DK responses, but examine each knowledge question separately.

proportion of correct, incorrect, and DK responses. That model generates two coefficients for each independent variable, one for the effect on the probability of giving correct rather than DK answers and another for the effect on correct rather than incorrect answers. I follow Mondak (2000) and Barabas (2002) in making correct responses the contrast category, which implies that coefficients have opposite signs as the OLS model. For example, women's verbal scores are 1.2 items (out of 10) lower than men's, according to OLS. The MNL results show that women are significantly more likely than men to answer DK rather than correctly ($\beta_{\text{correct vs. DK}} = .98$) and significantly more likely to respond incorrectly rather than correctly ($\beta_{\text{correct vs. incorrect}} = .30$). The predicted proportion of DK responses (holding other variables at their means or modes) is .24 among women, compared to only .12 among men. Most importantly, the two MNL coefficients are statistically different from each other, confirming that women respond DK more often than men when they do not answer correctly.

(Table 4 about here)

To test if failure to guess depresses women's performance in a similar way when the knowledge questions contain photos, I estimate the same MNL model for the visual condition. As the bottom half of Table 4 indicates, the two MNL coefficients are no longer statistically different from each other. On the visual knowledge test, women are just as likely as men to give incorrect as opposed to DK answers. As a result, their predicted proportion of DK responses (.20) differs little from that among men (.21). But visual questions not only remove differences between the two MNL coefficients; they also reduce the overall influence of gender. In the verbal condition, both coefficients are different from zero. In the visual condition, neither one is. (The MNL results are not a necessary consequence of the insignificant OLS coefficient. It would have been possible for women to guess less than men, but also give more incorrect answers.)

These findings are consistent with research that shows a smaller—but still significant—gender gap on verbal knowledge when corrections for guessing are made (Kenski and Jamieson 2000; Mondak and Anderson 2004). Mondak and Anderson (2004, 510) conclude that “the true gender disparity has been overstated due to the effects of a guessing response set. Nonetheless, the sources

of the remaining portion of the gender gap on knowledge continue to prove elusive.” Although visual knowledge questions appear to lower the gender gap by reducing distortions from guessing, some other factor contributes to eliminating the gap altogether. I discuss possible contenders in the conclusion.

The MNL coefficients for visual-verbal style are also statistically different from each other only in the verbal condition. Verbalizers benefit from guessing in the verbal condition. While the relative likelihood of correct vs. incorrect responses does not depend on learning style, visualizers are more likely than verbalizers to answer DK than correctly. In the verbal condition, the proportion of DKs predicted for visualizers (one standard deviation above the mean) is .23, compared to .14 for verbalizers (one s.d. below the mean). The respective proportions in the visual condition are .22 and .19, indicating that guessing is less of a distortion.

Less educated respondents are doing poorly in the verbal condition, but not because of a failure to guess. The predicted proportion of DK responses among the least educated is only .14 (compared to .20 among the most educated). The MNL coefficients differ significantly in the verbal condition because correct responses to verbal questions become more likely at the expense of incorrect responses as education increases. The least educated give substantive responses, but they tend to be incorrect. The predicted proportion of incorrect answers is .46 for the least educated compared to .24 for the most educated.¹⁰ On visual knowledge, predicted proportions of both incorrect and DK answers do not change with education (shares of incorrect answers are .34 for low and .30 for high education; respective shares of DKs are .21 and .21). Less educated

¹⁰ The education effects in the verbal condition differ from those Mondak (2000) obtains. He finds a larger effect of education on DK vs. correct responses. This difference might emerge because I followed Mondak’s (2001) recommendation to discourage DKs, whereas the NES survey he uses did not.

respondents do better on the visual task either because their guesses are more informed or because the questions are easier for them.

For three other variables that affect visual knowledge differently than verbal knowledge, differential propensity to guess does not seem to explain the modality effect. Moderate political interest, a sense of civic duty, and race do not affect correct/DK and correct/incorrect probabilities differently in either of the two conditions. The effect of strength of partisanship might be more strongly affected by guessing in the visual condition, but its MNL coefficients are only different at $p < .10$.

Consequences of Visual Political Knowledge

Visual political knowledge is a valid indicator of civic competence and has different origins than verbal political knowledge. But does it matter politically? Political scientists ultimately care about political knowledge because in its verbal form it affects political attitudes (e.g., Althaus 1998; Gilens 2001) and behaviors (e.g., Bartels 1996). Verbal political knowledge is positively related to behaviors that are widely considered desirable, such as turnout (e.g., Delli Carpini and Keeter 1996). It would be difficult to recommend attention to visual knowledge, if it did not affect these dependent variables at all.

Here, I compare the effect of visual and verbal knowledge on turnout. To test the relationship with turnout in the two different experimental conditions, I regress respondents' self-reported turnout in the 2002 congressional and the 2000 presidential elections on political knowledge in the two experimental conditions.¹¹ As a comparison, I also report the relationship between turnout and an index of standard verbal knowledge questions based on the measure Delli Carpini and Keeter (1996, 304-6) recommended. Since the knowledge measures in the two experimental conditions

¹¹ As common in surveys, estimated turnout is inflated by overreporting: 76% of the respondents claimed to have voted in the 2000 presidential election, 64% in the 2002 House election.

range from 0 to 18, I extended Delli Carpini and Keeter's index to 10 items by using questions from both survey waves (see appendix for details).

Table 5 provides the logit estimates for the two experimental conditions and the modified Delli Carpini/Keeter measure. To compare coefficients more easily, all knowledge measures have been transformed to range from 0 to 1. The impact of political knowledge on both presidential and congressional turnout is significantly stronger in the visual condition than in the verbal condition. The change in the predicted turnout probability in presidential elections associated with moving from one standard deviation below the mean to one standard deviation above the mean is .38 in the visual condition, compared to only .26 in the verbal condition. Figure 3, which plots predicted values for both turnout measures, illustrates that visual political knowledge is a better predictor of turnout than verbal political knowledge. At low levels of knowledge, the visual measure predicts clearly lower turnout than the verbal measure. The reverse effect at high levels is present but smaller. This asymmetry is presumably an artifact of overreporting which pushes turnout at high levels of knowledge very close to the ceiling of a probability of one. The results replicate almost exactly when a turnout question about the 2000 congressional elections from the first survey wave is used.

(Table 5 and Figure 3 about here)

Table 5 and Figure 3 also report the relationship between the modified Delli Carpini/Keeter measure and turnout. While it predicts turnout about as well as the knowledge measure in the verbal condition, it does not come close to the predictive power of visual political knowledge. Moving from one standard deviation below the mean to one standard deviation above the mean on the modified Delli Carpini/Keeter measure changes the predicted probability of voting in the 2000 presidential election by .29—about one third less than the same difference on visual knowledge.

The results change little when control variables are included. With the same controls as in Table 3 in the presidential turnout model, the coefficient for knowledge is 1.74 in the verbal condition, compared to 3.41 in the visual condition. Control variables reduce the direct effect of

knowledge in both conditions, but the difference between the knowledge coefficients remains essentially the same. These results suggest that verbal measures underestimate the importance of political knowledge for turnout.

Conclusion

Visual political knowledge is different from verbal political knowledge and represents a previously unmeasured element of political involvement with significant substantive implications for political cognition and behavior. It reflects civic competence just as much as verbal political knowledge, according to validation against “instrumentally rational partisanship” (Delli Carpini and Keeter 1996, 252) and against other forms of political knowledge. And it is a *better* predictor of turnout than knowledge measured in the verbal condition of my experiment.

Visual political knowledge has different origins than verbal political knowledge. As political scientists have shown over and over again, when knowledge is measured using words alone, the less educated do worse than the more educated, women worse than men, and minorities worse than white people. People with a visual cognitive style also score lower on verbal knowledge than people with a verbal style. All of these individual differences are absent for visual political knowledge. Instead, respondents’ sense of civic duty and strength of partisanship are more strongly related to visual than verbal political knowledge.

In addition to establishing that visual and verbal political knowledge have different predictors, I have examined *why* they have different predictors. A multinomial logit model shows that in the verbal condition gender and visual-verbal style affect the probability of answering “Don’t know” differently than the probability of answering incorrectly (compared to the probability of a correct response). Women and visualizers do better on visual knowledge questions at least in part because the visual format encourages them to take a guess. But visuals did more than even out the effects on the relative probabilities of incorrect and DK answers. It diminished the overall influence of the variables. Women and visualizers became more likely to give correct answers. Women may be less

intimidated by visual questions about politics or better at remembering faces (see Lewin and Herlitz 2002). Visualizers may process and store information visually.

The effect of education is not explained by a relative decline in DK responses. Instead, education seems to matter less for visual knowledge questions because they do not reward literacy and formal schooling as much as the verbal measures. The reason for the effect of education on verbal knowledge cannot be learning from civics classes because the knowledge questions used in the experiments all referred to recent events and personalities. It is unlikely to be related to verbal ability fostered by education because education predicts verbal knowledge even after controlling for performance on a vocabulary test (often interpreted as a measure of cognitive skills). More likely, the effect of education reflects a procedural skill, such as greater test-taking experience.

More research is clearly needed to specify the respective contributions of learning and interview effects. The differential effects of race, civic duty, and political interest in the two experimental conditions appear to have little to do with the role of guessing. But guessing is only one (albeit important) type of interview effect. Stereotype threat has been shown to lower performance on political knowledge tests by women (McGlone, Aronson, and Kobrynowicz 2006) and minorities (Davis and Silver 2003). To the extent that visual knowledge questions reduce stereotype threat, gender and race differences should decline. But stereotype threat does not necessarily affect the DK-to-incorrect ratio used here to identify interview effects. To determine its effects on visual political knowledge, stereotype threat needs to be measured directly or manipulated experimentally.¹²

A second limitation of the present study is its use of questions about political facts that can be represented either verbally or with visual elements. Much political information does not have that

¹² It is noteworthy in this context that women and minorities performed worse in the verbal condition of this study even though respondents answered questions on a computer in the absence of potentially threatening interviewers of the opposite gender or another race.

property. For the first study of visual knowledge, I purposefully decided to hold constant the content of the question to be able to reach definite conclusions about modality differences. Any differences that emerge between experimental conditions must occur as a result of the modality difference. This would not be true for questions that do not have equivalents in both modalities. For example, better performance on a set of verbal questions about candidates' issue positions compared to a set of visual questions about their appearance could emerge because of modality differences *or* because of differences in question topic. Manipulating experimentally whether or not the same knowledge question included visual elements, I found that on average people do equally well on visual and verbal knowledge tasks. Some questions are easier in verbal form, others with visual elements, but there is no inherent advantage for one modality or the other.

Political information with visual and verbal representations often involves politicians' faces. As most experimental research using visual stimuli has focused on faces (e.g., Bailenson et al. 2006; Keating, Randall, and Kendrick 1999; Lang, Potter, and Bolls 1999; Rosenberg, Kahn, and Tran 1991; Sullivan 1996; Sullivan and Masters 1988), this is not an inappropriate starting point. But having established individual modality differences in performance on otherwise identical knowledge question, future research needs to sacrifice some comparative precision for greater topical variety. It is an important next step to extend the study of visual political knowledge to *typical* visual information without a verbal equivalent. (Defining what constitutes "typical" visual information will not be easy. But the same caution applies to verbal knowledge and has not kept researchers from measuring it.)

Although these limitations and qualifications demonstrate that we are at the very beginning of systematic research into the role of visuals in political cognition, they should not overshadow the contributions of the present study. According to most existing accounts, acquiring political knowledge is, to a considerable degree, a status game. Even holding constant motivational factors, group differences between young and old, men and women, whites and minorities, and more and less educated Americans persist. The verbal condition of my experiment illustrates this status game

well: An African American woman who did not finish high school scored 5 points lower on the 19-point index than a white man with a college degree, even when both were equally interested in politics, equally civic-minded, and equally good on a vocabulary test.

Yet these differences appear to be less of an enduring and hard-to-explain fact of life than past research leads us to believe. When the very same knowledge questions include visual elements, the African American woman without a high school degree is separated from the college-educated white male by a statistically insignificant half of a point. Even if the precise reasons remain ambiguous, it is significant to know that visual elements lower the importance of verbal cognitive style, encourage respondents to answer the knowledge questions, and reduce the impact of demographics and formal schooling in explaining political knowledge. The finding that visual political knowledge predicts turnout even better than verbal knowledge only adds significance to this finding. Visual political knowledge offers an alternative path to turnout—one that is considerably easier for women, minorities, and the less educated.

One practical recommendation for researchers who intend to measure political knowledge is also clear: Use a mix of verbal and visual questions to assess political knowledge whenever possible. Relying only on verbal questions appears to bias conclusions about the causes and consequences of political knowledge. Including visual elements makes knowledge tests more comprehensive and fairer to different mode publics.

Table 1: Verbal vs Visual—The main effects (Part 1)

| | Verbal | | | Visual | | |
|--|---------------------|-------|----|---------|-------|----|
| | Correct | False | DK | Correct | False | DK |
| “Who is...” Design | | | | | | |
| Who is the current secretary of defense? Donald Rumsfeld , John Ashcroft, George Tenet, Colin Powell | 48 | 48 | 4 | 48 | 48 | 4 |
| Who is the current Senate majority leader? Bill Frist , Trent Lott, Dick Gephardt, John Kerry | 36 | 51 | 13 | 33 | 51 | 16 |
| Who is the Chief Justice on the U.S. Supreme Court? William Rehnquist , Clarence Thomas, Antonin Scalia, Anthony Kennedy | 62* ^(b) | 24 | 14 | 55 | 26 | 19 |
| “Which office...” Design | | | | | | |
| What office is currently held by Condoleezza (“Condi”) Rice? U.S. Attorney General, National Security Adviser , Secretary of Defense, White House Chief of Staff | 51* ^(a) | 33 | 16 | 58 | 32 | 10 |
| What position is currently held by Ari Fleischer? White House Chief of Staff, White House Press Secretary , Education Secretary, Senior Presidential Campaign Advisor | 54** ^(a) | 22 | 24 | 74 | 14 | 13 |
| What position is currently held by Alan Greenspan? Director of the Central Intelligence Agency, Treasury Secretary, Chairman of the Federal Reserve , Commerce Secretary | 62 | 26 | 12 | 61 | 22 | 17 |

Note: Asterisks indicate a significant difference in the proportions of correct responses (** $p < .01$, * $p < .05$). Letter superscripts indicate a significant difference between the distributions of the three response categories in the two conditions (^(a) $p < .05$, ^(b) $p < .10$). All means calculated using sample weights.

Table 2: Verbal vs Visual—The main effects (Part II)

| | Verbal | | | Visual | | |
|--|--------------------|-------|----|---------|-------|----|
| <i>Grid Design</i> | Correct | False | DK | Correct | False | DK |
| For each of the following politicians, please indicate to which party they belong | | | | | | |
| Tom Daschle | 54* ^(b) | 20 | 26 | 47 | 22 | 32 |
| Christine Todd Whitman | 32* ^(b) | 27 | 41 | 38 | 27 | 35 |
| Howard Dean | 18 | 36 | 46 | 17 | 35 | 48 |
| Ralph Nader | 42 | 34 | 25 | 37 | 35 | 28 |
| <i>“Check All” Design</i> | Score | | | Score | | |
| <i>Place a check mark next to the politicians who currently hold party leadership positions (Tom DeLay, Nancy Pelosi, John McCain, Ted Kennedy)</i> | | | | | | |
| Number of correct check marks minus number of incorrect check marks (plus two) | 1.93 | | | 1.97 | | |
| <i>Place a check mark next to the politicians who has/have announced run for the Democratic nomination for President in 2004?(Joe Lieberman, Hillary Clinton, Al Gore, John Edwards)</i> | | | | | | |
| Number of correct check marks minus number of incorrect check marks (plus two) | 2.80 | | | 2.76 | | |

Note: Asterisks indicate a significant difference in the proportions of correct responses (** p < .01, * p < .05). Letter superscripts indicate a significant difference between the distributions of the three response categories in the two conditions (^(a) p < .05, ^(b) p < .10). The correlation between the knowledge scores in the Check All Design and the score based on the additive 10-point scale is .6. All entries calculated using sample weights.

Table 3: Explaining Political Knowledge, by Experimental Condition

| | <i>Verbal Condition</i> | <i>Visual Condition</i> |
|---|---------------------------------|-------------------------|
| Visual-Verbal Style (0-1) | -3.28** ^{###} (.93) | -.43 (1.10) |
| Education (1-6) | .57** ^{##} (.12) | .16 (.12) |
| Cognitive Skill (Vocabulary Test, 0-10) | .51** (.07) | .51** (.07) |
| TV is typical news source | .26 (.25) | -.08 (.28) |
| R is “somewhat” interested in politics | .89** [#] (.30) | .12 (.32) |
| R is “very” interested in politics | 1.70** (.37) | 1.28** (.41) |
| Political Efficacy (0-3) | .34 (.20) | .37 (.20) |
| Sense of Civic Duty (0-3) | .56* [#] (.23) | 1.20** (.25) |
| Strength of Party ID (0-3) | -.004 [#] (.11) | .28* (.12) |
| R is female | -1.80** ^{###} (.25) | -.08 (.27) |
| R is white | .94** ^{###} (.33) | -.11 (.36) |
| Income (1-17) | .17** (.03) | .11** (.04) |
| Age (in years) | .028** (.008) | .034** (.009) |
| Intercept | -.44 (.94) | .05 (1.09) |
| | Adj. R ² | .35 |
| | N | 800 |
| | | .25 |
| | | 765 |

* p<.05, ** p<.01; for difference between conditions: [#] p<.10, ^{###} p<.05

Note: The dependent variable is political knowledge as measured on a 19-point scale. Cell entries are OLS coefficients and standard errors in parentheses. Models also include dummy variables for respondents with missing data on cognitive skill, civic duty, and efficacy.

Table 4: Grouped Multinomial Logit Model of Political Knowledge, by Experimental Condition

| | <i>OLS</i> | <i>Grouped Multinomial Logit</i> | |
|---|---------------------------|----------------------------------|-------------------------|
| | | <i>Correct vs DK</i> | <i>Correct vs False</i> |
| <i>Verbal Condition (N=800)</i> | | | |
| Education (1-6) | .27 (.08)*** | -.01 (.10) | -.29 (.08)** |
| Cognitive Skill (Vocabulary Test, 0-10) | .36 (.05)*** | -.18 (.06)*** | -.15 (.05)*** |
| Visual-Verbal Style | -1.83 (.64)*** | 2.35 (.76)*** | -.11 (.66) |
| TV is typical news source | -.01 (.17) | .06 (.21) | -.06 (.18) |
| R is “somewhat” interested in politics | .61 (.20)*** | -.21 (.24) | -.29 (.21) |
| R is “very” interested in politics | 1.03 (.25)*** | -.58 (.31)* | -.39 (.26)* |
| Political Efficacy (0-3) | .28 (.14)** | -.17 (.16) | .10 (.14) |
| Sense of Civic Duty (0-3) | .36 (.16)** | -.30 (.19) | -.07 (.16) |
| Strength of Party ID (0-3) | -.05 (.08) | .07 (.09) | -.01 (.08) |
| R is female | -1.21 (.17)*** | .98 (.21)*** | .30 (.17)* |
| R is white | .52 (.23)*** | -.26 (.27) | -.22 (.23) |
| Income (1-17) | .10 (.02)*** | -.025 (.029) | -.058 (.024)** |
| Age (in years) | .016 (.006)*** | .011 (.007)* | -.018 (.006)*** |
| Intercept | -.71 (.65) | -.79 (.81) | 3.33 (.68) |
| | adj. R ² = .31 | $\chi^2 = 107.1$ | |
| <i>Visual Condition (N=765)</i> | | | |
| Education (1-6) | .08 (.09) | -.02 (.09) | -.05 (.08) |
| Cognitive Skill (Vocabulary Test, 0-10) | .35 (.05)*** | -.16 (.05)*** | -.14 (.05)*** |
| Visual-Verbal Style | -.08 (.75) | .55 (.84) | -.32 (.73) |
| TV is typical news source | .18 (.19) | -.22 (.21) | .02 (.19) |
| R is “somewhat” interested in politics | .13 (.19) | -.24 (.24) | .07 (.22) |
| R is “very” interested in politics | 1.00 (.28)*** | -.72 (.32)** | -.24 (.37) |
| Political Efficacy (0-3) | .23 (.14)* | -.06 (.15) | -.19 (.13) |
| Sense of Civic Duty (0-3) | .79 (.17)*** | -.33 (.19)* | -.34 (.16)** |
| Strength of Party ID (0-3) | .18 (.08)** | -.19 (.09)** | -.01 (.08) |
| R is female | -.10 (.18) | -.03 (.20) | .10 (.18) |
| R is white | .13 (.25) | .16 (.29) | -.17 (.23) |
| Income (1-17) | .07 (.03)*** | .004 (.03) | -.055 (.025)** |
| Age (in years) | .018 (.006)*** | -.001 (.007) | -.012 (.006)** |
| Intercept | -1.68 (.75)** | 1.07 (.84) | 2.89 (.74)*** |
| | adj. R ² = .24 | $\chi^2 = 66.4$ | |

*** p < .01, ** p < .05, * p < .10

Note: The dependent variables are the number of correct responses (OLS) and the proportion of correct, incorrect and DK responses (grouped MNL, with correct responses as the contrast category) in the “Who is,” “Which office,” and Grid designs. Coefficients in a solid frame are different from each other at p < .05. Broken frames indicate differences at p < .10.

Table 5: The Impact of Knowledge on Turnout, by Experimental Condition

| | <i>Verbal Condition</i> | <i>Visual Condition</i> | <i>Modified Delli Carpini/Keeter Index</i> |
|--|-----------------------------|-------------------------|--|
| <i>Voted in 2000 Presidential Election</i> | | | |
| Political Knowledge | 2.93* [#] (.51) | 4.57* (.63) | 2.92* (.37) |
| Intercept | -.12 [#] (.27) | -.94* (.31) | -.81* (.27) |
| <i>Pseudo R²</i> | .06 | .13 | .08 |
| <i>Log Likelihood</i> | -403.9 | -368.9 | -793.0 |
| <i>N</i> | 823 | 784 | 1607 |
| <i>Voted in 2002 Congressional Election</i> | | | |
| Political Knowledge | 2.51* [#] (.44) | 3.88* (.52) | 2.83* (.34) |
| Intercept | -.58 [#] (.25) | -1.38* (.28) | -1.43* (.26) |
| <i>Pseudo R²</i> | .05 | .12 | .07 |
| <i>Log Likelihood</i> | -496.4 | -451.9 | -963.4 |
| <i>N</i> | 820 | 778 | 1598 |

Note: All knowledge measures have been transformed to range from 0 to 1 to make the coefficients comparable. Cell entries are logit coefficients and robust standard errors in parentheses. (* $p < .001$; for difference between conditions: [#] $p < .05$)

Figure 1: “Which office...” Design, Example

Verbal Condition

What position is currently held by Alan Greenspan?


Select one answer only

- Director of the Central Intelligence Agency
- Treasury Secretary
- Commerce Secretary
- Chairman of the Federal Reserve

Next Question

Visual Condition

What position is currently held by the person shown in this picture?



Select one answer only

- Director of the Central Intelligence Agency
- Commerce Secretary
- Treasury Secretary
- Chairman of the Federal Reserve

Next Question

Figure 2: “Who is...” Design, Example

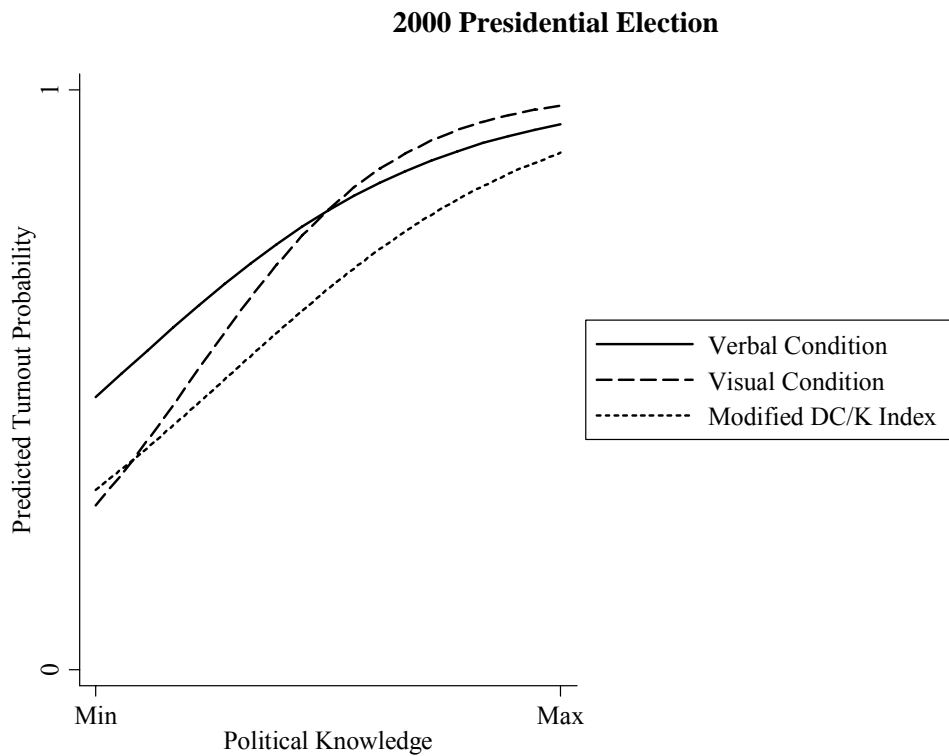
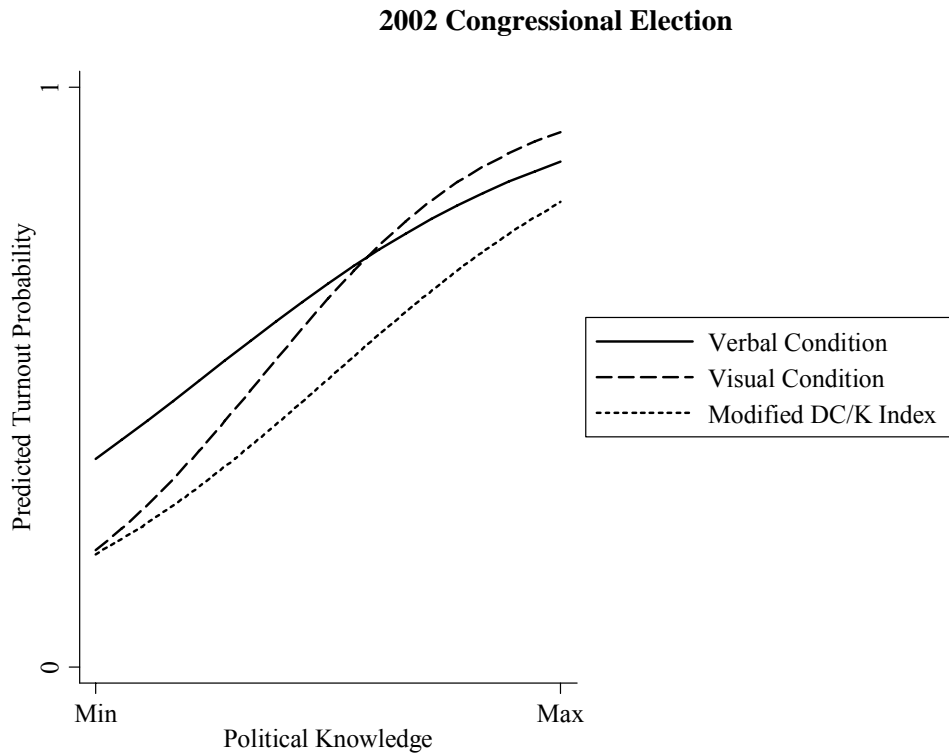
Verbal Condition



Visual Condition



Figure 3: Comparing the Impact of Political Knowledge on Turnout



Appendix

I. Knowledge Measures for Validation Analysis

The following seven multiple-choice items were used to create the index of “taught” facts. The additive index has a mean of 5.3 (s.d. = 1.8) and a reliability of .70 (Cronbach’s alpha). (Correct answers are shown in bold.)

How many four-year terms can the president of the United States serve? (1/2/3/unlimited number of terms) (Wave 1)

Whose responsibility is it to determine if a law is constitutional or not? (President/Congress/**Supreme Court**) (Both waves)

How much of a majority is required for the US Senate and House to override a presidential veto? (one-half plus one vote/three-fifths/**two-thirds**/three quarters) (Both waves)

In general, thinking about the political parties in Washington, would you say that Democrats are more conservative than Republicans, or Republicans are more conservative than Democrats? (Democrats more conservative/**Republicans more conservative**) (Both waves)

These eight items generated the measure of “surveillance” knowledge. The additive index has a mean of 4.7 (s.d. = 1.6) and a reliability of .64 (Cronbach’s alpha).

Which of the following countries shares a border with Afghanistan? (Russia/ **Pakistan**/ Iraq/ Kazakhstan) (Wave 1)

In the war in Afghanistan, which of the following groups fought on the side of the coalition led by the United States and Britain? (The Islamic Jihad/ The Taliban /**The Northern Alliance**/ Al-Qaeda) (Wave 1)

Which of the following agencies was founded in the wake of the terrorist attacks on September 11? (**Office for Homeland Security**/ Delta Force/ National Security Agency/ Department of Civilian Defense) (Wave 1)

Would you say there is more, less, or about the same amount of crime in the United States today as compared to 10 years ago? (**less**/ same/ more) (Wave 1)

For every dollar spent by the federal government in Washington, how much of each dollar do you think goes for foreign aid to help other countries? (open-ended, credit for $\leq 5\%$) (Wave 1)

Do you happen to know which party currently has the most members in the House of Representatives in Washington? (**Republicans**/ Democrats) (Both waves)

Do you happen to know which party currently has the most members in the Senate? (**Republicans**/ Democrats) (Wave 2)

II. Modified Delli Carpini/ Keeter Measure for Turnout Analysis

The additive 10-item index uses all items from the “taught” measure plus the three questions about congressional majorities from the “surveillance” measure. It has a mean of 7.4 (s.d. = 2.3) and a reliability of .71 (Cronbach’s alpha).

III. Visual-Verbal Style

The measure of cognitive style used in this study is based on Richardson's (1977) Visualizer-Verbalizer Questionnaire (VVQ), which uses a subset of items proposed by Paivio (1971). VVQ items that are intended to capture dream vividness were excluded. I selected five visual and five verbal items with the highest factors loadings. One of those 10 items ("I like newspaper articles that have graphs or pictures") is not used because it confounds attitudes towards a print medium and visuals. Scholars have debated the appropriate scoring of this scale. In particular, the dimensional structure of the VVQ measure is not clear (Boswell and Pickett 1991; Kirby, Moore, and Schofield 1988; Sullivan and Macklin 1986). My own analysis confirms these problems. A rotated principal components analysis of the remaining 9 items produces three factors with eigenvalues great than one. After orthogonal rotation, three of the items designed to measure verbal style load strongly on the first factor. Three items about pictures and maps load on the second factor. Three items load strongly on the third factor ("I read rather slowly," "I have always disliked jigsaw puzzles," and "I spend little time attempting to increase my vocabulary"). I added an item proposed by Mayer and Massa (Mayer and Massa 2003) to measure verbal ability. This item loads strongly on the first (verbal) factor and does not change the three-factor structure. In light of these and past inconsistencies with the VVQ factor structure, I decided to use only the three items with the strongest loadings on each of the first two factors. They are:

for verbal style

"I can easily think of synonyms for words"

"I have better than average fluency in using words"

Self assessment of verbal ability (very high, somewhat high, average, somewhat low, very low)

for visual style

"I don't like maps or diagrams in books" (reversed)

"The old saying 'A picture is worth a thousand words' is certainly true for me"

"I find maps helpful in finding my way around a new city"

To create separate verbal and visual style scales, I standardized and added the respective three items. (Except for verbal ability, response options were "strongly disagree," "disagree," "agree," and "strongly agree.") As in past research, visual and verbal style are positively correlated ($r=.18$ in this study, $r=.33$ in Mendelson and Thorson (2004), $r=.25$ in Kirby et al. (1988).) Because my primary interest is in distinguishing respondents with a predominantly visual style from those with a predominantly verbal style, I subtracted the verbal style score from the visual style score to create my measure of Visual-Verbal Style. Rescaled to run from 0 to 1, the measure has a mean of .48 and a standard deviation of .13. When the two separate measures are used instead in the model in Table 3, verbal style has a positive and significant effect in the verbal condition that disappears in the visual condition (coefficients are different at $p = .028$.) Visual style has a negative and significant effect on verbal knowledge. The effect is cut in half and non-significant in the visual condition, but the difference between the two coefficients is not significant.)

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