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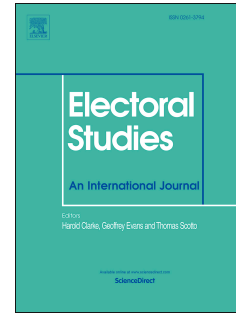
Decomposing political Knowledge:What is confidence in knowledge and why it matters

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Decomposing Political Knowledge:

What Is Confidence in Knowledge and Why It Matters

Abstract

While political knowledge has been conceptually defined with two constructs – accuracy and confidence in factual information – conventional measurement of political knowledge has relied heavily on retrieval accuracy. Without measuring confidence-in-knowledge, it is not possible to rigorously identify different types of political informedness, such as misinformedness and uninformedness. This article theoretically explores the two constructs of knowledge and argues that each construct has unique antecedents and behavioral consequences. We suggest a survey instrument for confidence-in-knowledge and introduce a method to estimate latent traits of retrieval accuracy and confidence separately. Using our original survey that includes the measure of confidence-in-knowledge, we find that misinformed citizens are as engaged in politics as the well-informed, but their active involvement does not guarantee informed political choices. Our findings warrant further theoretical and empirical exploration of confidence in political knowledge.

Keywords: political knowledge; retrieval accuracy; confidence-in-knowledge; IRT model

"Think of the person who makes a true statement based on adequate reasons,
but does not feel confident that it is true.
Obviously, he is much less likely to act on it, and,
in the extreme case of lack of confidence, would not act on it."
–Pears, "What is Knowledge?" (1971, p.15)

1. Introduction

Political knowledge is an important factor to understand citizens' attitudes and behavior in the political domain. A certain level of political knowledge increases citizens' ability to connect their interests with specific public issues and promotes political participation, whereas lack of such knowledge and a strong belief in false information misguide citizens' policy preferences (Kuklinski et al. 2000). Moreover, a growing literature suggests that misinformation can be more detrimental than the mere lack of correct information since it misguides citizens' policy preferences (e.g., Kuklinski et al. 2000) and cannot be easily corrected (Berinsky 2015; Lewandowsky et al. 2012; Nyhan and Reifler 2010). This, in turn, will endanger the quality of democratic governance (Hochschild and Einstein 2015).

It is also well acknowledged that the typical way of measuring political knowledge entails biases and limitations. Measuring political knowledge by scaling how accurate survey respondents' answers for a series of questions about political systems, political figures, and current affairs cannot distinguish a response based on guessing from one based on strong belief in the retrieved information. Consequently, the conventional measurement that relies solely on retrieval accuracy inevitably results in misidentification problems, particularly in studies where the distinction between individuals who hold incorrect information based on strong belief (misinformedness) and those who give incorrect answers due to guessing (uninformedness) is critical. Previous research has proposed various methods to deal with this issue, but most of them are post-hoc survey tools applied at the analysis stage to detect guessing behavior or to reveal latent levels of political knowledge. Yet, there has not been much of advancement in survey design to cope with this measurement problem.

In this study, we propose a method to decompose two aspects of political knowledge – *accuracy in retrieving information stored in memory* (hereafter, *retrieval accuracy*) and

confidence-in-knowledge. In doing so, we use a simple survey instrument to capture confidence-in-knowledge, an under-appreciated aspect of political knowledge, to solve the measurement issue in political knowledge. The survey instrument is useful in handling the biases due to guessing and allows us to fully address the two constructs that are used to conceptually define political knowledge and different types of political informedness. We also introduce a statistical method for latent scaling, an extension of Item Response Theory (IRT) models, that identifies the two constructs of political knowledge in two independent dimensions. Using this method we estimate individual respondents' latent traits for the ability to accurately retrieve stored information (latent accuracy) and for the level of information accessibility and familiarity (latent confidence).

We administer an online survey in the UK that includes the survey instrument to measure confidence-in-knowledge. Using the estimates from our method, we map individual survey respondents on the conceptually defined two-dimensional space of political knowledge. Our empirical analysis shows that the confidence-in-knowledge measure can help overcome limitations of the conventional survey measures of political knowledge (that primarily focus on retrieval accuracy).

In this paper, we first demonstrate that respondents' reported levels of confidence in their responses to factual questions (i.e., confidence-in-knowledge) could be a good proxy of the availability and accessibility of political information. Particularly, we demonstrate that the confidence-in-knowledge measure is necessary to define various types of "informedness" and to empirically distinguish the misinformed from the uninformed drawing on previous conceptual work. With the two decomposed constructs of political knowledge, we revisit existing theories about the causes and effects of political knowledge to identify which construct of political knowledge is more strongly associated with the relevant political variables. In this replication analysis, we find that misinformed citizens (highly confident but less accurate) are as active as well-informed citizens (highly confident and very accurate) in political engagement. Overall, this study contributes to a better understanding of political knowledge by demonstrating potential biases when using the traditional measure as the sole proxy of political knowledge and advantages of incorporating the confidence-in-knowledge construct in the measurement of political knowledge.

2. Concerns in Measuring Knowledge with Retrieval Accuracy

Political knowledge is typically measured by counting the number of correct responses by a survey respondent to a series of questions about political facts. Despite its extensive use in various studies on citizens' behavior and information processing, this measurement is far from being perfect. First, when recalling or retrieving stored memory, individuals may forget relevant information or reconstruct the information erroneously. Second, potential biases due the propensity of guessing are more concerning. Particularly when Don't Know (DK) is provided as a response option, the propensity of guessing is systematically related to other variables. For example, male respondents are more likely than female respondents to make a random guess instead of answering DK when they are uncertain about the correct answer. The estimated level of political knowledge therefore tends to be systematically higher for male respondents than for female counterparts even if their actual knowledge levels are the same (Mondak and Anderson 2004). Several studies have estimated the prevalence of such biases and suggested a better survey design to reduce this bias (Miller and Orr 2008; Mondak and Anderson 2003, 2004; Mondak and Davis 2001; Sturgis, Allum, and Smith 2008).

However, there is a more fundamental conceptual issue in the conventional measurement of political knowledge. Although the conventional measure assumes that the "accuracy" in the retrieval of stored information indicates the depth and extent of available information, political knowledge (and types of "informedness") has been conceptually defined not only with the correctness of answers, but also with the strength of beliefs in knowledge. For instance, Kuklinski and colleagues state:

> "[T]o be *in*formed requires, first, that people have factual beliefs and, second, that the beliefs be accurate. If people do not hold factual beliefs at all, they are merely *un*informed. They are, with respect to the particular matter, in the dark. But if they firmly hold beliefs that happen to be wrong, they are *mis*informed–not just in the dark, but wrongheaded." (Kuklinski et al. 2000, 792–3, emphases from original)

Similarly, Mondak and Davis (2001) define different types of political knowledge, where the strength of belief in the correctness is the key to differentiate misinformedness from

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uninformedness. Pasek et al. (2015) also emphasize that we should distinguish ignorance (lacking a correct belief) and misinformation (holding an incorrect belief with confidence). To summarize, these works suggest that there are at least four types of individuals in terms of political informedness, defined by both the level of accuracy and the level of confidence-in-knowledge. Figure 1 illustrates these four types of informedness on a two-dimensional space: misinformed, uninformed, partially informed, and fully informed.

Figure 1. Conceptualization of Political Knowledge
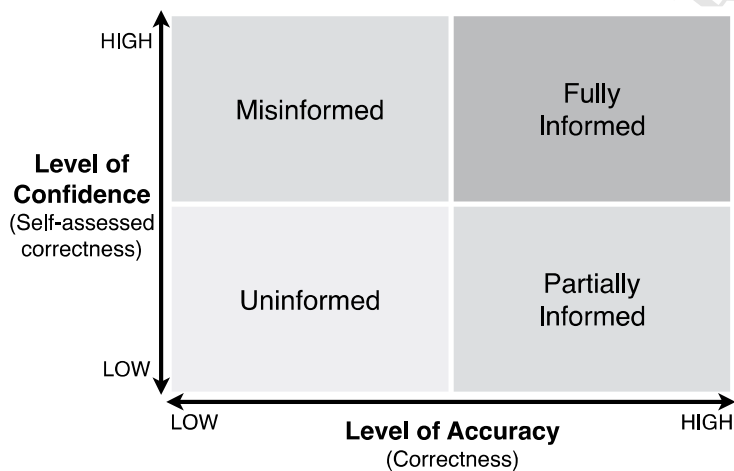
Note: The x-axis denotes the level of accuracy, which is often measured by classic factual knowledge items, and the y-axis denotes the level of confidence – how confident individuals are about their knowledge about political facts.

Although the conventional measurement (i.e., retrieval accuracy) maps individuals' level of knowledge onto a single dimension (e.g., uninformed vs. fully informed), the construct of "confidence in factual knowledge" extends the space to further distinguish those who are at the same level of retrieval accuracy into two groups based on the strength of their beliefs in the correctness of their responses (misinformed vs. partially informed for those with low retrieval accuracy and fully informed vs. partially informed for those with high retrieval accuracy). The confidence-in-knowledge dimension is particularly important to identify whether a response to a factual question is based on a genuine belief or on guessing and thus to examine whether the consequences of such misbelief can be substantially different from the same incorrect answer based on guessing.

Despite broad agreement among scholars on this conceptualization, it is surprising that only a few studies have taken the confidence-in-knowledge dimension seriously both in their theoretical and empirical definition of political knowledge.[1]

3. Sources of Confidence-in-Knowledge: Information Accessibility and Familiarity

A general definition of knowledge is "information stored in memory." The literature suggests that there are at least two ways for individuals to express the stored information: recalling the information directly (aka objective knowledge) and indicating how sure they are that specific piece of information is available in memory (aka subjective knowledge, feeling of knowing, perceived knowledge or *confidence in knowledge*, which we use here) (e.g., Schacter 1983). Psychologists found that the two aspects of knowledge are distinct constructs; each has a unique measure and antecedents (Park, Mothersbaugh, and Feick 1994; Radecki and Jaccard 1995); the two constructs influence search and choice behavior differently (Radecki and Jaccard 1995; Raju, Lonial, and Mangold 1995); and they often do not correspond.[2]

General definitions of "political" knowledge share this understanding of knowledge such as "factual information about politics and government that individuals retain in their memory" (Keeter 2008). Political scientists, while not always explicit, also suggest that accuracy and confidence may have different effects on behaviors such as searching and processing political information (e.g., Dancey and Sheagley 2013; Koch 2003; Kuklinski et al. 2000; Nadeau and Niemi 1995). One such finding is that overconfidence in knowledge

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[1] Studies on misinformation or misperception are not the exception. Lacking the measure of confidence-in-knowledge, they usually do not differentiate the misinformed from the uninformed in their empirical definition of misinformedness (e.g., Bode and Vraga 2015; Kuklinski et al. 2000; Maurer and Reinemann 2006; Nyhan and Reifler 2010).

[2] The relationship between the two constructs is rather inclusive as correlation coefficients shown in previous studies vary widely (Moorman et al. 2004): Some reported the correlation higher than 0.5 (e.g., 0.54 in Brucks 1985; 0.65 in Park et al. 1994) while others reported very low correlations (e.g., 0.08 in Ellen 1994; 0.05 in Radecki and Jaccard 1995).

(misinformedness) can be more detrimental than the mere lack of correct information without strong belief in it (uninformedness) because the former misleads individuals' preferences and the subsequent political choices and judgments (e.g. Lewandowsky et al. 2005).[3] Other studies show that individuals who are more confident in their knowledge are less active in searching for information and more likely to rely on cognitive shortcuts (Dancey and Sheagley 2013). Although confidence-in-knowledge is important for understanding the consequences of political knowledge, we know very little about it.[4]

What is confidence in knowledge and where does it originate? Psychologists find that confidence-in-knowledge involves a self-assessed ability to find related or cued facts in memory and thus represents the ability to express knowledge stored in memory (e.g., Radecki and Jaccard 1995). For example, an individual who is asked to recall some specific information but is unable to may still know enough to indicate whether or not s/he would be able to recognize it (Schacter 1983, 39). Confidence-in-knowledge taps into this mode of expressing knowledge about unrecalled or incorrectly retrieved information that cannot be captured by the typical measurement of retrieval accuracy, and thus represents the availability, accessibility, or familiarity of information stored in one's memory.

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[3] Moreover, misinformation is widespread in politics (Kuklinski et al. 2000; Nyhan 2010), but correcting misinformation is hard, especially for politically committed people (Lewandowsky et al. 2005; Nyhan and Reifler 2010).

[4] We recognize that studies on voters' perceptions about candidates (or leaders' perceptions about constituents) use the concept of perceptual (un)certainty (e.g., Alvarez and Franklin 1994; Bartels 1986; Clausen 1977; Clausen, Holmberg, and DeHaven-Smith 1983; Koch 2003; Sanders 2001). On the surface, perceptual (un)certainty appears to be relevant to confidence-in-knowledge in the present study because both are dealing with uncertainty and the survey questions tapping into the concepts are similar (i.e., "how confident/ certain are you..."). However, there are several fundamental differences. First, perceptual (un)certainty in previous studies focuses on the uncertainty in a subject's judgmental statement about *others*, where no definite correct or wrong answer exists (but we can only tell with the degree of (in)congruence between, for example, a candidate's observed ideological orientation and voters' perception about it). Given the fact that the perceptual (un)certainty is employed in the context of how voters (or leaders) perceive politicians' (or constituents') left-right placement, attitudes, and issue positions, using the same terminology may cause some confusions. Second, more importantly, the concept of confidence-in-knowledge in this study belongs strictly to the dimensions of factual knowledge that, measured by the number of correct answers for factual knowledge items, previous studies found as one of the determinants of such perceptual (un)certainty (e.g., Glasgow and Alvarez 2000; Koch 2003). This apparently suggests that the literature speaks to different matters.

If confidence-in-knowledge represents the availability or accessibility of information stored in memory, we should observe different behavioral consequences for individuals whose stored information is less available from those whose stored information is more available. One such manifestation would be response latency. Response latency is a general behavioral measure of the amount of cognitive efforts required to process information, and its association with information accessibility and attitude accessibility is well established (e.g., Bassili 1996; Fazio 1990; Fazio et al. 1982; Higgins and King 1981; Huckfeldt et al. 1999, 2005; Lavine, Borgida, and Sullivan 2000). The "accessibility" is defined by the ease and quickness with which a person can retrieve an attitude or information from memory. If a higher level of confidence-in-knowledge indicates a greater accessibility and availability of information, the response time for the fact-based questions must be shorter for a person who is more confident about the answer than a person less confident.

This leads to an expectation that the confidence-in-knowledge will be negatively associated with response time for answering factual questions (i.e., the higher the confidence, the quicker the response). We, however, do not expect that retrieval accuracy is necessarily associated with the reaction time. This is because the retrieval accuracy may result from processes other than mere access to information. For instance, the same correct response to a question may require longer reaction time for good guessers than true sophisticates (and even than unsophisticates who accidently pick the correct answer without speculation). We test these expectations in the first part of the empirical section by examining how each construct is associated with reaction time. A negative association between confidence and response time will support that confidence-in-knowledge represents the accessibility and familiarity of relevant information stored in one's memory.

In summary, echoing the theoretical conceptualization of political knowledge proposed in previous studies, we claim that political knowledge should be defined by at least two constructs: 1) the availability and accessibility of stored information (captured by confidence-in-knowledge) and 2) the accuracy of recalled or retrieved information (captured by retrieval accuracy). And whether confidence in knowledge is a good proxy of the accessibility and familiarity of information can be empirically assessed by examining its

relation with response time: an individual with higher confidence in her or his knowledge should respond to factual questions more rapidly than those with lower confidence.

4. Do Accuracy and Confidence Share the Same Antecedents and Consequences?

This section elucidates which aspect of political knowledge (accuracy vs. confidence) the existing theories about political knowledge are speaking to. Decomposing the concept of political knowledge into the two constructs, we revisit explanations in the literature and propose hypotheses that identify different relationships of retrieval accuracy and confidence-in-knowledge with well-known causes and consequences of political knowledge in the literature.

Antecedents of Political Knowledge: Motivation and Intellectual Capability

A consistent finding in political behavior research is that people who are more interested in politics and more educated are likely to be more knowledgeable about politics. Political interest is the core motivation to seek out political information and learn about politics, and thus one of the most important antecedents of political knowledge. The key mechanism underlying this linkage is that politically interested citizens seek out and consume more information, and in this process they "encounter and think more seriously about the political information they notice" (Luskin 1990). If a higher level of interest fosters more exposure to political information, as told, the immediate consequence will essentially be the expansion of available information – an increase in accessibility and familiarity of information they have sought out.

While the process described above suggests that political interest affects the availability of information, we do not expect that political interest will necessarily enhance retrieval accuracy. Instead, we think there is one more hurdle to achieve accuracy in retrieving information – individuals' cognitive and intellectual ability developed though repeated learning processes for encoding and retrieval. The level of formal education, which the literature consistently found having a strong association with political knowledge, might be a good proxy for this specific ability to accurately retrieve stored information because

"[c]ognitive skills are learned in school […] that make subsequent learning about politics easier" (Delli Carpini and Keeter 1996, 193).

Putting together, the two most common antecedents of political knowledge in the literature – political interest and education – motivate political knowledge differently. Political interest is more likely to increase the accessibility and the familiarity of political information and will thus have a substantial impact on confidence-in-knowledge than retrieval accuracy. In contrast, we expect that levels of educational attainment will have a stronger association with retrieval accuracy than confidence-in-knowledge.

Consequences of Political Knowledge: Political Engagement and Informed Choices

Political knowledge is known to be associated with a number of important political traits, including stability of political attitudes, political trust, support for democratic values, political participation, and informed choices (see Galston (2001) for a comprehensive review). Among others, our discussion below focuses on political engagement and informed vote choice and whether and how the two constructs of political knowledge affect them.

Why does political knowledge promote political engagement? According to Delli Carpini and Keeter (1996), knowledge "promotes an understanding of why politics is relevant" (224) and "provides the specific facts necessary to make citizens aware of opportunities to participate, and of how to participate once aware of these opportunities" (225). The major contribution of political knowledge in this process is making individuals *recognize the importance of politics and participation opportunities*. In the fulfillment of this task, greater exposure to abundant political information, which would lead to a higher level of availability and accessibility of political information, can be more important in enhancing the general sense of "civic duty" than retrieval accuracy. The reason is that an individual who possesses a wide range of "incorrect" information could also recognize the importance of politics and participation opportunities. Therefore, we expect that it is confidence-in-knowledge than retrieval accuracy that fosters citizen involvement in the democratic process.

We expect that retrieval accuracy, instead, is more closely associated with the quality of opinions and political decisions. In the literature, the core contribution of political knowledge to informed political choices is its role in *promoting enlightened self-interest* and *making choices based on self-interest*. Possessing accurate information is necessary for citizens to be able to connect personal or group interests with specific public issues and with political agents who can best represent the self-interest.[5] Lau and Redlawsk (1997) consider the concept of "correct voting" in the continuum of retrieval accuracy, defining it as "the choice which would have been made under conditions of full information" (586).

Our discussion on the core mechanisms through which political knowledge promotes political participation and informed political choices leads to expectations that confidence-in-knowledge is a better predictor of political engagement than retrieval accuracy and that retrieval accuracy is more important for citizens' ability to make better political choices than confidence-in-knowledge.

Decomposing the two aspects of political knowledge, we posit that confidence-in-knowledge represents the extent to which information stored in one's memory is accessible, available, and familiar. Based on the distinction between retrieval accuracy and confidence-in-knowledge, our review of the theories about political knowledge suggests that "political knowledge" in these theories sometimes indicates one construct than the other. We derive several testable hypotheses to validate which construct of political knowledge better corresponds to the mechanisms suggested by the literature. First, with regard to the role of political interest and intellectual ability in enhancing political knowledge, we expect that political interest is more closely associated with confidence-in-knowledge than retrieval accuracy (H1), whereas educational attainment is more closely associated with retrieval accuracy than confidence (H2). Second, when it comes to the role of political knowledge in encouraging political engagement and informed choice, we expect

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[5] In comparison, "less well-informed citizens canvass fewer relevant considerations, absorb less of the ongoing political debate, discern less clearly the differences between the competing candidates, and attach less weight to the implications of those differences for their own political values" (Bartels 1996, 202).

that confidence-in-knowledge is more closely associated with political engagement (H3), whereas retrieval accuracy is more closely associated with informed choice (H4).

5. Data

Survey Design and Knowledge Questions

We conducted an online survey in which a total of 792 citizens of the UK participated. The survey was fielded in November 2013 using Survey Sampling International's online sample.[6] We asked nine factual questions about civic and political knowledge. To reduce the bias due to guessing, "Don't Know" option was not offered (Miller and Orr 2008; Mondak 2000, 2001; Mondak and Davis 2001). Instead, we asked respondents to rate their confidence in the correctness of their answer to each item ("How confident are you that your answer is correct?") on a scale from 0 to 100.[7]

This self-assessed confidence rating is primarily to measure the "confidence-in-knowledge" that represents the availability and accessibility of information relevant to the topic of the question. The self-assessed rating can also be an auxiliary measure for the degree of guessing involved in survey responses when DK is not an option – Respondents will give higher confidence ratings on the questions for which they have more available and accessible information than on less familiar issues where they have to guess.[8]

Retrieval accuracy is measured in the conventional way by looking at whether the answer is correct. The nine questions are about "world facts" (Nadeau and Niemi 1995; Strube 1987), including the current economic situation (unemployment rate), societal change

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[6] See Online Appendix F for the comparison of sample characteristics between our respondents and the British Election Survey.

[7] Respondents made the confidence ratings by moving a slider bar. We set the initial "anchor" value at 50 to avoid bias due to the anchoring value (Cervone and Peake 1986; Tversky and Kahneman 1974).

[8] In addition to this *item-level* variance within an individual, responses to the self-assessed confidence can differ due to *individual-level* factors. The drivers of inter-personal differences will be captured in our statistical model.

(immigrant group), government composition, party leaders, and political systems (see Appendix). These questions tap into "what people should know about politics" (Delli Carpini and Keeter 1993) and are the kind of non-contentious factual questions typically used in electoral and political surveys.

Descriptive Results

Respondents correctly answered an average of 5.7 items and the average rating of self-assessed confidence was 71.5. Figure 2 provides a general picture of knowledge domains where respondents easily (or hardly) get the answers correct and where they are over-confident (or under-confident). For each question, the dark-colored bar indicates the percentage of respondents who gave the correct answer, and the light-colored bar indicates the mean confidence rating from all respondents. The figure shows that questions about the Party of the Prime Minister and the Party of Nick Clegg are the easiest ones (more than 80 percent of the respondents answered correctly) and the question about the Party of the Logo (Conservative Party) is the most difficult one (less than 45 percent answered correctly) followed by the question about the Party of Natalie Bennett.[9]

Figure 2. Percentage of Correct Responses and Mean Confidence Ratings

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[9] We code the correctness of each answer with a dichotomous variable. For the rank-order question for the sizes of parties, we only consider the rank ordering for the three major parties (Conservatives, Labour, and Liberal Democrats): We take it as correct when a respondent correctly rank orders the three parties' sizes (seat shares in the House of Common). For the question about Parties in Cabinet, we accept it as correct when the respondent selects both parties in the coalition.
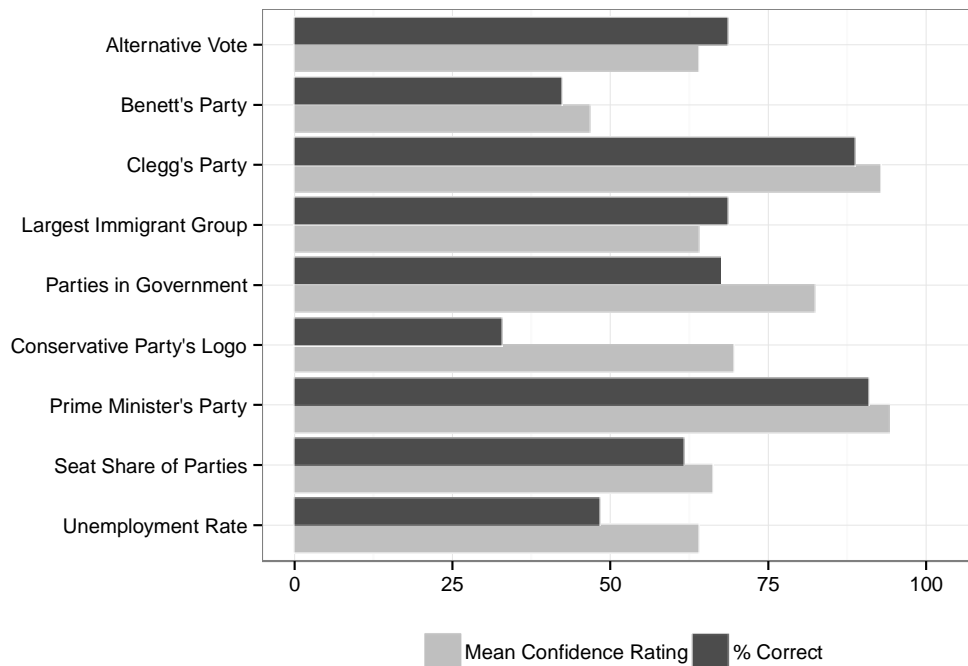
An interesting finding from this aggregate result is that confidence ratings do not always correspond to the level of retrieval accuracy.[10] Although respondents are generally more confident on easier questions, the mean confidence rating for the most difficult question is not particularly low (and even higher than the mean confidence rating across all items).

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[10] This pattern – varying correspondence between confidence and accuracy – is also found in Pasek et al. (2015)'s study on the American citizens' knowledge of the Affordable Care Act.

Figure 3. Distributions of Confidence Ratings for Correct and Incorrect Answers
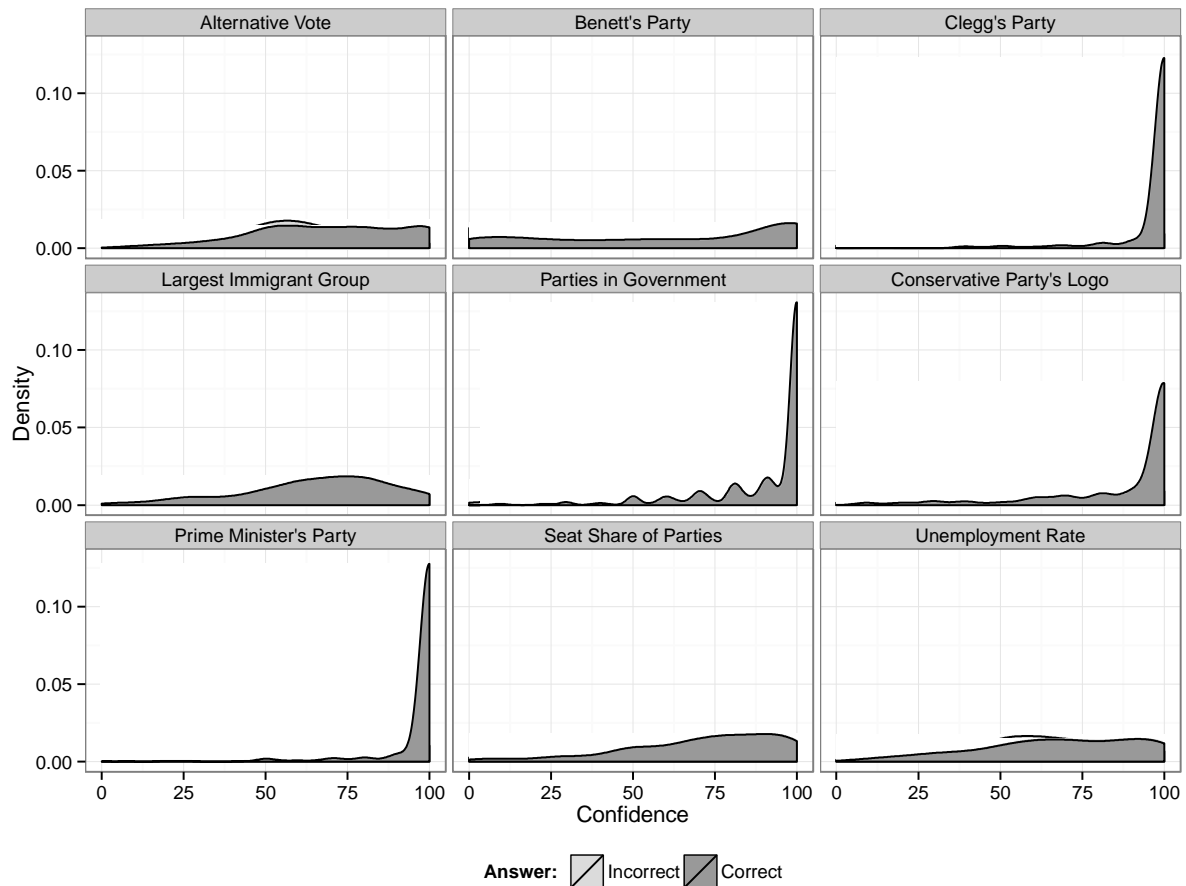

Figure 3 demonstrates this pattern more clearly. For each item, we draw two distributions for the confidence ratings (x-axis): One for those who gave the correct answer and the other for those who gave the wrong answer. If higher accuracy always leads to higher confidence, the distribution of the group that answered correctly will be noticeably different from that of the group that answered incorrectly and the distribution for the former will peak to the right of the distribution for the latter. This pattern is observed only in four (or five) items – Party of Nick Clegg, Parties in Government, Party Logo, and Party of Prime Minister (and probably Party of Natalie Bennett). For the rest, the distributions of both groups are largely overlapping. This indicates that the relationship between accuracy and confidence varies considerably across knowledge domains.

14

The varying patterns of retrieval accuracy and confidence ratings across knowledge domains necessitate an estimation strategy that takes into account item-specific characteristics. In consideration of such item-specific traits, we build a statistical model to obtain measures for two latent traits of individual respondents – the ability to accurately retrieve the requested information (*latent accuracy*) and the availability or accessibility of the relevant information stored in the person's memory (*latent confidence*). These measures for latent traits will eventually be mapped on the conceptually defined two-dimensional space of political knowledge (Figure 1), and we use them to test our hypotheses. Before we estimate the latent traits and test the hypotheses, however, we first need to validate whether the confidence-in-knowledge is a good proxy of information accessibility.

Confidence as a Proxy of Information Accessibility

To assess our expectation that confidence ratings will be negatively associated with response time, we run several multivariate models where we regress response time in seconds (log-transformed) on the two variables from the survey – the correctness of answer and the confidence rating.[11] Table 1 reports the results from multivariate OLS models that include different combinations of item-specific fixed effects and individual-specific random effects. The results are consistent across models and in support of our expectation: Response time is negatively associated with confidence ratings and positively with correctness.[12] Regardless of the correctness of their answers, respondents with high

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[11] Correctness is a dichotomous variable where 1 denotes a correct answer and 0 otherwise. Confidence rating originally ranges from 0 to 100, but we recoded it to vary from 0 to 1 to make comparisons of estimated effects more intuitive.

[12] Some might raise a concern that online survey takers sometimes "cheat" by looking up other Internet pages to answer knowledge questions (e.g., Clifford and Jerit 2016; Jensen and Thomsen 2014), and thus that the positive relationship between accuracy and response time might be the artifact of such behavior. Although our survey unfortunately did not include instructions discouraging cheating, we find that our results are not significantly affected by cheating, or that the effect of such behavior must be marginal. If many of the respondents cheated, we should observe that the reaction time should have the same relationship with the correctness and with the reported confidence rating because cheating will result in both correct answers and higher confidence in correctness. Moreover, given the finding that looking up the Internet led to shorter response time (Jensen and Thomsen 2014), the relationship between accuracy and reaction time

confidence require shorter time to answer a factual question than those with low confidence.

Table 1. Response Time Model

	Dependent Variable: Log (Response Time for Each Item)				
	(1)	(2)	(3)	(4)	(5)
Answered correctly	0.234***	0.213***	0.168***	0.082***	0.074**
	(0.026)	(0.026)	(0.026)	(0.023)	(0.023)
Confidence rating	-0.744***	-0.240***	-0.201***	-0.367***	-0.358***
	(0.045)	(0.047)	(0.047)	(0.045)	(0.045)
Gender (male)			-0.071**		-0.046
			(0.022)		(0.043)
Age			0.008		0.012
			(0.005)		(0.009)
Age^2			0.000		-0.000
			(0.000)		(0.000)
Education			-0.029**		-0.024
			(0.009)		(0.018)
Constant	2.413***	2.401***	2.148***	2.574***	2.189***
	(0.032)	(0.044)	(0.114)	(0.043)	(0.217)
Fixed Effects (Item)	No	Yes	Yes	Yes	Yes
Random Effects (Individual)	No	No	No	Yes	Yes
R^2	0.041	0.169	0.196		
Number of observations	6581	6581	6581	6581	6581
Number of groups				732	732
Variance (Intercept)				0.297	0.269
Variance (Residual)				0.487	0.487

Note: *** $p < 0.001$, ** $p < 0.01$. The dependent variable is the natural-log transformed response time. Due to technical issues, response times of sixty respondents are missing.

6. Measuring Accuracy and Confidence with Latent Scale Modeling

To test our hypotheses, we need the measures of accuracy and confidence that correspond to the conceptual map in Figure 1. There are two possible ways to measure accuracy and confidence at the individual level. First, a straightforward way is to use the reported

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should be negative, not positive as we found, and subsequently the relationship between confidence and reaction time should be also negative. This works against our expectation that the relations with reaction time will be different for retrieval accuracy and confidence-in-knowledge.

measures directly constructed from survey responses, such as the number of correct answers (for accuracy) and the average of confidence ratings across items (for confidence). Second, a more sophisticated way is to apply methods for scaling latent traits to estimate an individual respondent's latent ability of retrieval accuracy (i.e., latent accuracy) and latent accessibility of relevant information (i.e., latent confidence).

We take the latter approach in this study for two reasons. First, for the number of correct answers to represent respondents' retrieval accuracy, we should assume that all questions are equally important to measure the retrieval accuracy. This is obviously not always the case. For example, some inherently easy questions do not say much about the respondents' political knowledge while harder questions are likely to better distinguish respondents at various levels of informedness. We have shown in Figures 2 and 3, some political knowledge questions in our survey better differentiate the respondents than other items. This necessitates a methodology that detects characteristics of the items and assigns more weights on informative questions than less informative ones. The latent scaling models we employ here accomplish this.

Second, for the purpose of this particular research, it is desirable to estimate the latent confidence that is not directly caused by the latent accuracy, so that our respondents can be located in the two-dimensional space corresponding to the conceptual map (Figure 1). From the reported measures we already know that the correlation between the two observed measures is moderate at best (r=0.39). This justifies that our conceptual map is more than unidimensional. However, it is also true that in some cases retrieval accuracy could enhance reported confidence ratings. Our latent scaling model adjusts the existing moderate-to-weak association between the two reported measures so that the resulting latent confidence scale captures a single latent trait independent from the latent accuracy.[13]

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[13] To preview, the correlation between the two resulting latent scales are close to zero (r=0.05), while these latent scales hold a strong relationship with their respective reported measures (r>0.81). See Online Appendix C for the correlation matrix between the reported and latent measures of accuracy and confidence.

We propose a method of latent scales by extending an Item Response Theory (IRT) model, a widely-used method to estimate latent ability or traits (e.g., Delli Carpini and Keeter 1993; Levendusky and Jackman 2003). Our model estimates two latent scales of political knowledge – latent accuracy and latent confidence. Using a standard IRT model in which outcome variable is the correctness of the answer to each question, we estimate the latent accuracy for each respondent as a single measure. Similarly, using the self-reported confidence rating for each question as the outcome variable, we estimate the latent confidence scale through a method similar to the latent accuracy model.

Latent Accuracy Model

In our latent accuracy model, we assume that a latent trait of individual's accuracy explains a binary outcome of whether or not a respondent gives a correct answer for each question. A standard IRT model is appropriate to estimate this type of latent traits. In our application, we use a two-parameter IRT model (Jackman 2009, 454-458).

The outcome variable, Y_{ij}, is a binary variable for the correctness of respondent i's answer to j-th question. The variable takes 1 if the answer is correct, otherwise 0. There is an auxiliary random variable, y_{ij}, which indicates the value of the binary outcome variable:

$$Y_{ij} = \begin{cases} 1 & \text{if } y_{ij} > 0 \\ 0 & \text{otherwise} \end{cases}$$

and, the value of y_{ij} is determined by the following formula:

$$\begin{aligned} y_{ij} &= \gamma_j \theta_i - \lambda_j + e_{ij} \\ e_{ij} &\sim N(0,1) \end{aligned} \tag{1}$$

where y_{ij} is a linear combination of a parameter at individual respondent level (θ_i), two parameters at item level (γ_j and λ_j), and a random error with the standard normal distribution (e_{ij}). The parameter of our main interest is θ_i, which is an unobservable, latent measure of respondent i's ability to retrieve information accurately. The intercept, λ_j, is an *item difficulty* parameter of item j: For a difficult question with large λ_j, it is less likely that y_{ij} takes positive value. The slope, γ_j, is an *item discrimination* parameter: When

the value of γ_j is large, a small change in the latent accuracy, θ_i, can have a large effect on the value of y_{ij} at a particular level of θ_i.

Latent Confidence Model

In our survey, each factual knowledge question is followed by a question about the respondent's confidence in the correctness of the answer. In this latent confidence model, we assume that there is a general, individual-level latent trait of confidence in political knowledge for a respondent i, denoted δ_i, and that latent confidence is reflected in the reported level of confidence rating for each question, C_{ij}. The confidence equation has a specification similar to y_{ij} in the latent accuracy model (Equation 1), but C_{ij} is directly measurable from survey questions on a continuous scale (which is inverse-logit transformed in actual estimation). The latent confidence model is specified as a linear model with a random error term:

$$
\begin{aligned}
C_{ij} &= \beta_{1j}\delta_i + \beta_{2j}\theta_i - \alpha_j + \epsilon_{ij} \\
\epsilon_{ij} &\sim N(0, \sigma_\epsilon^2)
\end{aligned}
\tag{2}
$$

where two latent measures of political knowledge are simultaneously included. The latent accuracy, θ_i, is included in this equation to capture its effect on the reported confidence rating, C_{ij}. It is worth highlighting that by including both terms, the estimated confidence level δ_i becomes the latent confidence level *not explained* by the retrieval accuracy. This separation of δ_i from θ_i assures the independence of latent confidence from latent accuracy, allowing us to explore the confidence-in-knowledge as a latent trait *after* accounting for its contribution to retrieval accuracy.

The resemblance of Equation 2 and 1 allows simple interpretation of item-level parameters in Equation 2. Each of the two latent scales at the individual level is multiplied by an item-specific slope coefficient (β_{1j} or β_{2j}). The meanings of these slopes are similar to the discrimination parameter γ_j in the latent accuracy model: The larger β_{1j} (or β_{2j}) is, the larger the effect of the latent confidence (or accuracy, respectively) on the reported confidence rating for item j. The intercept α_j is analogues to the item difficulty parameter in the latent accuracy model: When an item j has a larger α_j, it indicates that the item

"seems difficult" to a respondent and that respondents tend to report lower confidence ratings on average.

Other Outcome Variables Explained by Latent Scales

Our hypotheses regarding consequences of political knowledge (H3 and H4) contend that retrieval accuracy and confidence-in-knowledge will explain other outcome variables, such as political engagement and informed vote choice. To test them, we include both the latent accuracy and confidence scales as the predictors of the outcome variables. Since the latent scales have no single representative value as they are measured as a distribution, it might be an intuitive solution to use summary measures – such as mean of median of distributions – to estimate these models. However, this solution ignores the uncertainty around the latent scales and the results can be biased (Hollyer, Rosendorff, and Vreeland 2014; Junker, Schofield, and Taylor 2012). Therefore, we instead incorporate our two latent trait models into a unified model and jointly estimate this system of models exploiting the flexibility of Bayesian modeling (cf. Fox and Glas 2003).

Model Identification

Latent scale models have identification problem because models are identified up to a linear transformation even in the one dimensional scaling case (c.f. Fox, 2010, Chapter 4), and this issue could be more complicated under the multidimensional latent scaling because of the issue of rotation. Rivers (2003) discusses the case of multidimensional latent models for the IRT modeling, with particular focus on the ideological point estimation using the roll-call votes as the input of the model. Despite some similarities between our identification problem and that of higher dimensional ideal point estimation, they are essentially different. Our model has two measured outcomes as notated in Equations 1 and 2, instead of one in multidimensional ideal point estimation (e.g., roll-call votes), and therefore the rotation of two latent scales is not a concern. There are two identification strategies to obtain well-defined posterior distributions: one by normalization (global identification) and another by fixing the variance (local identification). We estimated our models with both strategies and the key results were essentially the same. In Section 7, we present our results by using the local identification

20

strategy with an informed prior (the standard normal distributions) on the distributions of the two latent scales (c.f. Jackman, 2009) as the interpretation of these results are more intuitive.[14]

We estimate the model through Markov chain Monte Carlo (MCMC) simulation implemented in JAGS 4.1.0, setting a diffuse prior for parameters except for the two latent scales. We run 20,000 iterations for two chains with thinning of 10 after 5,000 burn-in. The MCMC diagnostics show no sign of non-convergence. More detailed model descriptions, JAGS code, and MCMC diagnostics are available in Online Appendix.

Estimates from Latent Scale Models

Item Level Parameters

Figure 4 shows the posterior density plots of difficulty and discrimination parameters from the latent accuracy model. The sizes of parameters vary across knowledge items. For example, the difficulty parameter for the Party Logo question is particularly large and the discrimination parameter is also moderately large. These parameter estimates indicate that the Party Logo item is an example of a "difficult" question that distinguishes respondents with high and low retrieval accuracy, i.e., most respondents give the wrong answer for this question but respondents with high levels of accuracy are very likely to answer correctly.

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[14] Online Appendix A provides an extensive discussion on the identification of our model as well as the descriptions and results of globally identified models.

Figure 4. Difficulty and Discrimination Parameter Estimates from Latent Accuracy Model
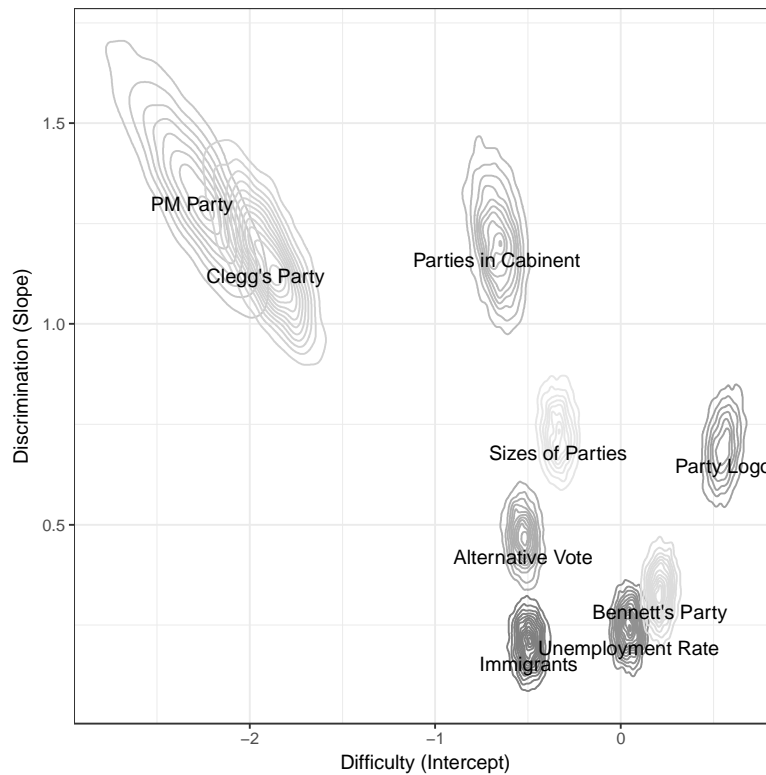

Four items – Parties in Cabinet, Size of Parties, Alternative Vote, and Immigrants – have similar difficulty parameters, but their discrimination parameters are quite different. The discrimination parameter for the Parties in Cabinet is the largest, indicating that this item is most strongly represented by the latent accuracy, θ; the discrimination parameter for Immigrants is the smallest, indicating that the likelihood of correctly answering this question is not particularly high even for the respondents with a high level of accuracy than those with a lower level of accuracy.

Next, Figure 5 plots the parameters from the latent confidence model. The horizontal axis indicates the estimates of intercept parameter, α, and the vertical axis indicates the estimates of the slope coefficients, β_1, for the latent confidence. The two estimates draw a linear relationship: When the intercept parameters are large, the slopes are large as well. The order in the sizes of the intercept parameters is similar to the (reverse) order in the

reported average confidence rating for each item (see Figure 2). For example, the PM's Party question has the smallest intercept. In the latent accuracy model, this item is one of the least difficult items. Similarly, in the latent confidence model, this is one of the items to which respondents are very likely to report that they are confident of their answer regardless of the level of their latent confidence. In contrast, the Bennett's Party question better distinguishes respondents with a low level of latent confidence from those with a high level of confidence, i.e., although the average confidence rating for this item is lower than other items, respondents with a higher level of latent confidence tend to report higher confidence ratings in survey. To summarize, our results for the parameter estimates indicate that each item contributes differentially to our understanding of respondents' latent traits regarding retrieval accuracy and confidence in knowledge. This justifies the use of latent scale modeling.

Figure 5. Intercept and Slope Parameter Estimates from Latent Confidence Model
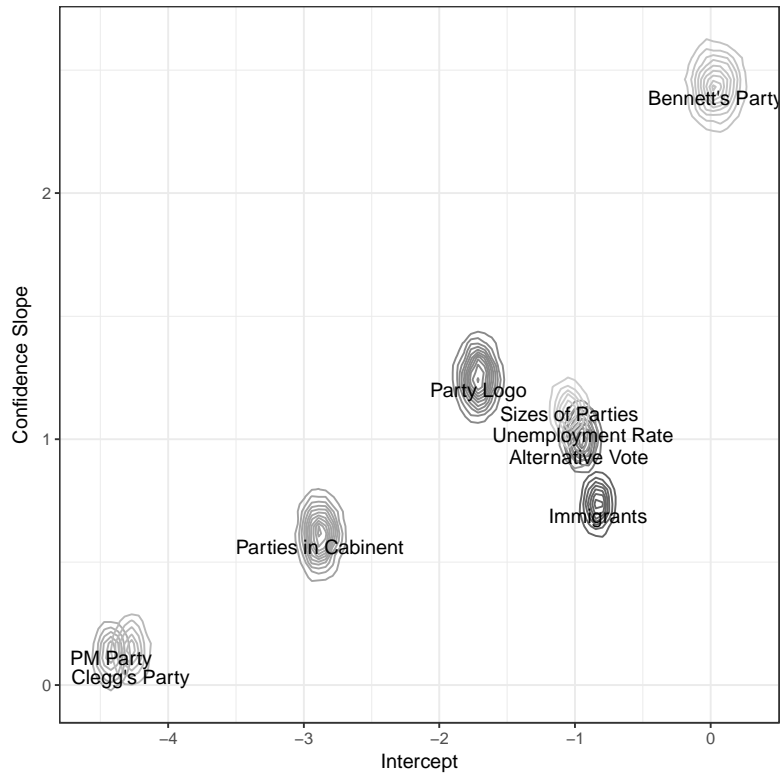
Individual Level Parameters

The parameters of our main interests are the latent accuracy θ_i and the latent confidence δ_i of each individual respondent. Figure 6 maps individual respondents in two dimensional political knowledge spaces using the median θ_i against the median δ_i from MCMC samples. Each point indicates each respondent's median level of the two latent traits. The plot exhibits little correlation between latent accuracy and latent confidence ($r^2 = 0.05$) as we have specified the latent confidence model in a way that an individual's latent confidence and latent accuracy can independently influence the reported confidence ratings for each item (Equation 2).

Figure 6. Mapping Respondents on the Two Conceptual Dimensions
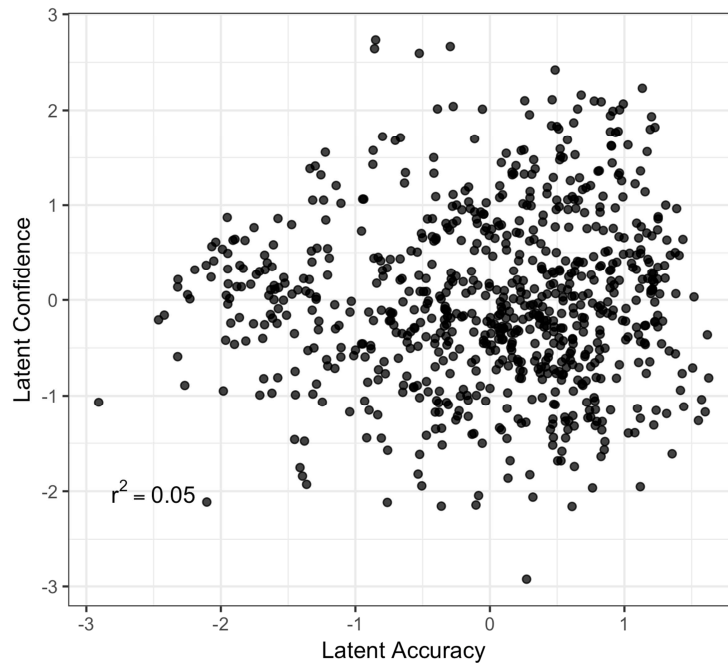
7. Testing Hypotheses

We test our four hypotheses using parameter estimates from the MCMC simulations. We first explore how political interest and education are differently associated with the levels of retrieval accuracy and confidence (H1 and H2). We then show the differential effects of retrieval accuracy and confidence in knowledge on political engagement and informed vote choice (H3 and H4).[15] When interpreting the results, it is important to acknowledge that our two latent scales have the same distribution with zero mean and the variance of one, which makes the effects of the two latent scales directly comparable.

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[15] By referring to antecedents and consequences of political knowledge, we do not claim strict causal relationship between the variables. We acknowledge that we cannot exclude the possibility of the reciprocal or reverse causal relations (e.g., political interest and political knowledge may reinforce each other). Our intention to use these terms is to indicate "typical" models that treat political knowledge as an explanatory or outcome variable in various political behavior studies.
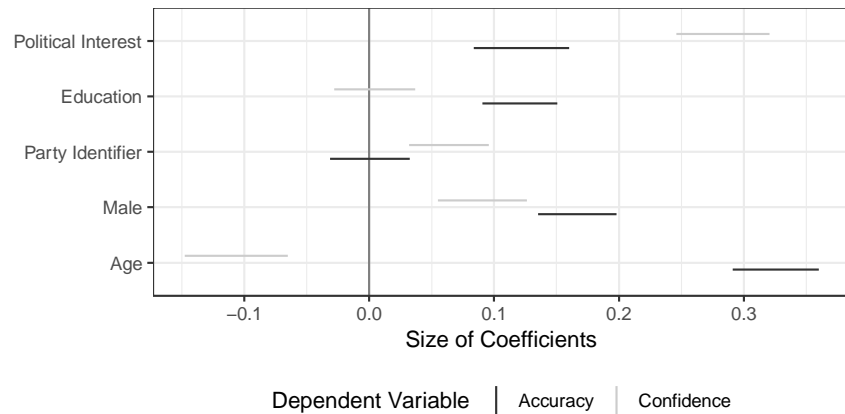
Political Knowledge as Outcome Variable

Based on the theories about antecedents of political knowledge, we expect that political interest is a more important determinant for confidence-in-knowledge than for retrieval accuracy while educational attainment is more important for retrieval accuracy.

We estimate two linear models in which each latent scale is a dependent variable. The variables of interest are *political interest* and *educational attainment*.[16] The model includes party identification, gender and age as control variables that are commonly used to predict political knowledge (Delli Carpini and Keeter 1996; Dolan 2011; Dow 2009; Jerit, Barabas, and Bolsen 2006). To incorporate the uncertainty in the latent scale estimates, we employ a strategy advocated by Armstrong II et al. (2014, 282–6), in which a model is estimated repeatedly for each value of MCMC samples, and the distribution of point estimates of each parameter is used to calculate a confidence interval.

Figure 7 presents the standardized coefficients of political interest and education from the accuracy and confidence models with the bounds of 95 percent confidence intervals. The results support our expectations. Both political interest and education have positive effects on latent accuracy, but only political interest has a positive effect on latent confidence. As expected, the results show that political interest has a stronger association with latent confidence than with latent accuracy (H1), and that higher educational attainment enhances retrieval accuracy, but has no such association with confidence (H2).

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[16] Education is measured on a five-point scale, from no qualifications to postgraduate degree, and political interest on a four-point scale from not at all interested to very interested. Party identifier is a dichotomous variable indicating whether a respondent identified herself with a party.

Figure 7. The Effects of Political Interest and Education on Two Latent Traits

Note: The point indicates the mean of coefficients estimates. Solid lines indicate the Bayesian credible intervals corresponding to 95 percent credible intervals. All variables are standardized.

Political Knowledge as Explanatory Variable

We now test the last two hypotheses. We estimate models where the two latent scales and the interaction between the two are the predictors of political engagement and informed political choice. We expect that latent confidence will be the key construct to encourage political engagement (H3), whereas latent accuracy will be more important to foster informed choices (H4).

In our model of political engagement, we use the frequency of political discussion as the dependent variable.[17] The equation for political discussion is specified simply as a linear model with a normally distributed error term:

---

[17] Self-reported turnout or intention to vote is one of the most common types of political engagement that political knowledge predicts. In our survey, there is one question relevant to electoral participation, but not in a desirable format. The option "not to vote" is included as a choice option in a typical vote intention question along with a list of party names. As the result, the percentage of abstention was unrealistically low (9%). Due to this problem, we use political discussion (i.e., "when you get together with your friends, would you say you discuss political matters frequently, occasionally, rarely, or never?") – a form of political engagement (Solt 2008; Van Deth and Elff 2004; e.g., Verba, Burns, and Schlozman 1997) – as the dependent variable.

$\text{Poldisc}_i | \theta_i, \delta_i, \mathbf{X}_i, v_{\text{Poldisc}}, \eta_{\text{Poldisc}} \sim N(v_{\text{Poldisc},1}\theta_i + v_{\text{Poldisc},2}\delta_i + v_{\text{Poldisc},3}\theta_i * \delta_i + \mathbf{X}_i\eta_{\text{Poldisc}}, \sigma_{\text{Poldisc}}),$ (3)

where θ_i and δ_i denote the two latent variables, and $\mathbf{X}_i$ is a vector of control variables that may also influence political discussion. The control variables include age, age^2, gender, education, political interest, and whether a respondent is a party identifier. For comparison, we also report the results from an OLS regression that uses the number of correct answers for accuracy instead of the latent scale.

Table 2. Consequences of Political Knowledge: Political Engagement

| | Dependent Variable: Political Discussion | | | |
	Model 1	Model 2	Model 3	Model 4
Number of Correct Answer	0.070	0.033		
	(0.012, 0.127)	(-0.017, 0.083)		
Latent Accuracy			0.076	0.022
			(0.010, 0.145)	(-0.036, 0.079)
Latent Confidence			0.202	0.083
			(0.139, 0.265)	(0.026, 0.140)
Latent Accuracy x Latent Confidence			0.006	0.033
			(-0.072, 0.080)	(-0.033, 0.101)
Political Interest		0.498		0.472
		(0.437, 0.559)		(0.408, 0.540)
Gender (Male)	0.046	-0.075	-0.015	-0.090
	(-0.067, 0.158)	(-0.173, 0.024)	(-0.130, 0.095)	(-0.189, 0.011)
Education	0.059	0.034	0.055	0.036
	(0.012, 0.106)	(-0.007, 0.074)	(0.009, 0.100)	(-0.006, 0.077)
Party identifier	0.504	0.103	0.403	0.091
	(0.328, 0.679)	(-0.057, 0.263)	(0.225, 0.573)	(-0.069, 0.249)
Age	-0.753	0.623	-0.979	0.442
	(-3.149, 1.644)	(-1.464, 2.711)	(-3.052, 1.363)	(-1.649, 2.589)
Age^2	0.159	-0.857	0.584	-0.577
	(-2.453, 2.772)	(-3.129, 1.415)	(-1.933, 2.839)	(-2.923, 1.739)
Constant	2.486	1.015	2.635	1.135
	(1.904, 3.068)	(0.478, 1.551)	(2.073, 3.164)	(0.525, 1.665)
Observations	790	790	790	790
R^2	0.071	0.300		

Models 1 and 2: Results from OLS regressions using the conventional measure for comparison. Models 3 and 4: Results from the joint scaling models. Models 2 and 4 include political interest as a control variable. The upper and lower bounds of 95 percent confidence intervals (Models 1 and 2) and credible intervals (Models 3 and 4) are in parentheses.

Table 2 reports the results from four models: The first two include the number of correct answer to measure retrieval accuracy, with and without political interest as a control variable; and the last two include the latent scales for retrieval accuracy and confidence-in-knowledge and an interaction between the two, with and without political interest. In Models 1 and 3 that do not include political interest, political knowledge has a significant positive effect on political discussion, regardless of the type of measurements used. However, the sizes of the effects are different: Individuals with a higher level of confidence-in-knowledge are more likely to be active in political discussion than those with the same level of retrieval accuracy.

Political interest, once included in the model, becomes the foremost important variable to explain political discussion, which is not surprising given our theoretical justification earlier. In Models 2 and 4, all of the political knowledge measurements are positively associated with political discussion. However, the effect of retrieval accuracy, regardless of the type of measures, becomes indistinguishable from zero effect, whereas the effect of latent confidence is still remained significant and positively associated with political discussion as we expected (H3). Lastly, we do not find a meaningful interaction effect between the two latent traits on political discussion (Models 3 and 4). All together, the results suggest that it is the availability and familiarity with political information than retrieval accuracy that matter more for individuals to actively participate in political discussion.

Based on Model 3, we calculate the predicted level of political discussion. In Figure 8, the three panels demonstrate the substantive effects of latent traits. The x-axis is an individual's latent accuracy or confidence level based on the percentile from the sample, and the y-axis is the predicted value for political discussion. The first panel demonstrates that an increase in the level of latent accuracy does not make a meaningful difference in the level of political discussion. However, the middle panel shows that as an individual becomes more active in political discussion when the level of latent confident increases (from 20 to 80 percentile).

In the last panel, we draw two prediction lines separately for those at low and high levels of latent confidence while varying the level of latent accuracy on the x-axis. The figure clearly demonstrates that the level of engagement in political discussion is significantly higher when a person has a higher level of confidence (the upper line) compared to the same person with a lower level of confidence (the bottom line). The results consistently indicate that it is the latent confidence (than latent accuracy) that makes a significant behavioral difference in political discussion. Echoing this, the figure also demonstrates that those with low retrieval accuracy and high confidence (Misinformed) are significantly more active in political discussions than those with high retrieval accuracy and low confidence (Partially Informed). Overall, the results support our claim that political engagement is more closely associated with confidence-in-knowledge than with retrieval accuracy.

Figure 8. The Effects of Latent Accuracy and Latent Confidence on Political Discussion
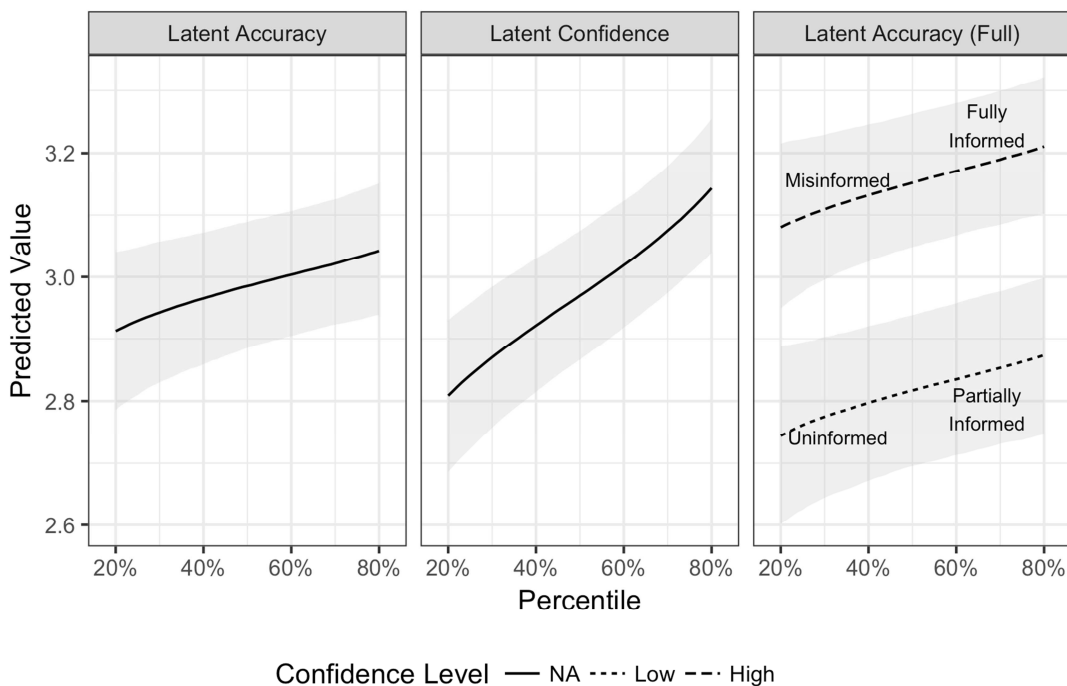
Note: The x-axis is an individual's latent accuracy or confidence level based on the percentile from the sample, and the y-axis is the predicted value for political discussion. The values of input are presented as the percentile of accuracy (the left-most and the right-most panels) or confidence (center) from the MCMC samples, with fixed values for control variables at their mean or median.

Lastly, we examine the impact of the two constructs on informed political choice (H4) employing the concept of "correct voting" proposed by Lau and Redlawsk (1997). Among various ways to operationalize the concept, we utilize the one related to the "prospective policy-based considerations" used in Lau et al. (2014) to measure whether a respondent makes a decision by voting for a party whose position is the most approximate to the person's position in the left-right ideological spectrum. The proximity is calculated from ideological self-placement in our survey and "true" ideological positions of parties based on expert judgments in 2014 Chapel Hill Expert Survey (Bakker et al. 2012). We construct a binary measure that indicates whether or not a respondent is willing to vote for a party that is ideologically closest to her. We estimate a probit model that includes a set of control variables and is specified as:

$$\Pr(\text{Informed}_i = 1 | \theta_i, \delta_i, \mathbf{X}_i, \nu_{\text{Informed}}, \eta_{\text{Informed}}) =$$
$$\Phi\big(\nu_{\text{Informed},1}\theta_i + \nu_{\text{Informed},2}\delta_i + \nu_{\text{Informed},3}\theta_i * \delta_i + \mathbf{X}_i\eta_{\text{Informed}}\big). \qquad (4)$$

In Table 3, we report the results using the latent scales in Model 2 and the results using the number of correct answers in Model 1 for comparison. As hypothesized, the latent accuracy significantly increases the chance to support the ideologically closest party while the effect of the latent confidence is in the opposite direction in Model 2. Interestingly, this positive effect of accuracy on correct voting is more pronounced when coupled with a high level of confidence, as the coefficient estimate of the interaction term is positive.

Table 3. Consequences of Political Knowledge: Voting Correctly

	Dependent Variable: Voting for a party that is ideologically closest to the respondent	
	Model 1	Model 2
Number of Correct Answer	0.187 (0.085, 0.289)	
Latent Accuracy		0.221 (0.091, 0.357)
Latent Confidence		-0.141 (-0.268, -0.016)
Latent Accuracy x Latent Confidence		0.223 (0.075, 0.382)
Gender (Male)	0.007 (-0.188, 0.201)	0.015 (-0.187, 0.221)

	Model 1	Model 2
Education	0.090	0.097
	(0.007, 0.174)	(0.016, 0.182)
Party Identifier	0.710	0.805
	(0.349, 1.072)	(0.436, 1.198)
Age	3.082	2.931
	(-1.165, 7.329)	(-0.941, 6.793)
Age^2	-2.251	-2.183
	(-6.827, 2,326)	(-6.399, 1.914)
Constant	-2.332	-2.401
	(-3.402, -1.262)	(-3.474, -1.374)
Observations	790	790
AIC	965.370	

Model 1: Probit model (MLE), Model 2: Results from the joint model. The upper and lower bounds of 95 percent confidence intervals (Model 1) and credible intervals (Model 2) are in parentheses.

We show this conditional effect in Figure 9, where we show the substantive effect of the latent accuracy on correct voting with 95 percent credible intervals – i.e., the difference in the probability of correct voting when latent accuracy changes from low (20 percentile) to high (80 percentile). The substantive effect of latent accuracy for those with high level of latent confidence is on the top and that for those with low level of latent confidence is on the bottom. The results on the top indicate that the latent accuracy tends to significantly increase the probability of correct voting (by 0.25 on average) for those with high confidence (e.g., when an individual becomes fully-informed from being misinformed). However, this is not the case for those whose confidence is at the low level, indicating that the probability of correct voting is not so different between the uninformed and the partially informed.

Figure 9. Substantive Effects of Latent Accuracy on Correct Voting, Conditional on the Level of Latent Confidence
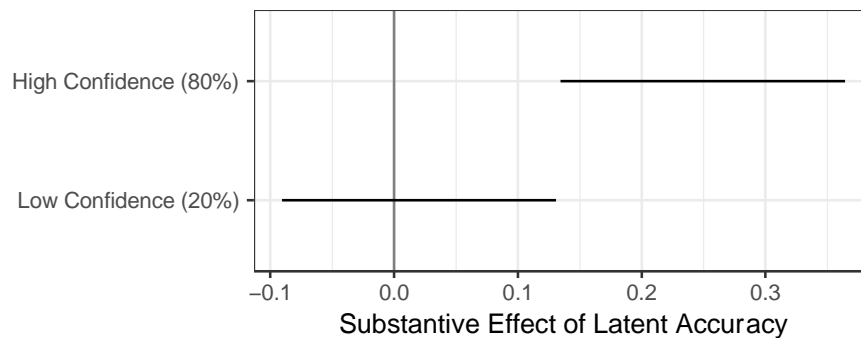
8. Conclusion and Discussion

Decades of political science research highlighted the importance of political knowledge in fostering the competency of democratic citizens and the quality of democracy. How to conceptualize, operationalize, and measure political knowledge has long been central concerns for researchers because political knowledge – by definition, the range of factual political information stored in memory – is a concept that cannot be easily observed. Extensive efforts have made to devise measurement techniques to get close to the "true" level of political knowledge, with the established practice that asks questions about political facts essential to exercise democratic citizenship and counts the degree of accuracy in the reported responses.

Although the conventional measure certainly taps into an important aspect of political knowledge, it has limitations in accounting for human errors in the retrieval process. Confidence-in-knowledge, along with retrieval accuracy, is necessary to define different types of political informedness that cannot be captured by the conventional measure. We know very little about why some people are more confident in their factual knowledge than others, where the confidence comes from, and whether it is important to understand political knowledge.

This study is an initial effort to understand this under-appreciated aspect. Drawing on the relevant literature in cognitive psychology and consumer behavior, we argue that confidence-in-knowledge is a way of expressing one's knowledge, which may or may not be retrieved accurately, and that it represents the accessibility and availability of relevant information. In our original survey, we ask a set of factual questions about politics followed

by questions about self-assessed confidence in the correctness of their answers. Our empirical analysis found that people who respond more rapidly to a factual question indicated a higher level of confidence in their responses. This resonates the finding from the literature that a short response time indicates the ease and readiness in conducting a given cognitive task and supports our claim that a greater accessibility and familiarity of information would be associated with confidence-in-knowledge.

Based on the distinction of the two aspects of political knowledge, we reassess the key mechanisms embedded in the theories about political knowledge. In our revisit to the theories, we articulate which aspect (accuracy vs. confidence) the theory refers to with "political knowledge", and propose testable hypotheses that retrieval accuracy and confidence-in-knowledge are determined by different foundations and have distinctive effects on various forms of political behavior. In testing our claims, we presented a method, as an extension of IRT models, to measure the respondents' latent ability to accurately retrieve stored information (latent accuracy) and latent accessibility and familiarity of political information (latent confidence).

Utilizing the resulting two latent scales for accuracy and confidence, our empirical analyses reveal that each trait has a unique origin and consequences. A key foundation of confidence-in-knowledge is political interest, whereas that of retrieval accuracy is educational attainment, a proxy of intellectual ability and learning experience. We also find that confidence-in-knowledge is more closely associated with political engagement while retrieval accuracy is more closely associated with informed vote choice. Our findings imply that individuals who are more confident in their political knowledge engage in political discussions more frequently, but this active involvement may not result in political choices that are consistent with their preferences or interests unless their high confidence is coupled with high accuracy.

This study is also suggestive of future research on predicting political behavior. For instance, without measuring confidence-in-knowledge it would be impossible to find that misinformed citizens participate as actively as well-informed citizens, and that the uninformed and the misinformed are much different in terms of political engagement. The

conceptual and empirical work in this study leads to the conclusion that measuring confidence-in-knowledge is not only a useful instrument to validate biases and measurement issues in the conventional measurement, but also improves our understanding of political knowledge.

Appendix. Political Knowledge Questions

* Choice options in all questions except #2 are shown in randomized order. Respondents are not allowed to skip questions.

1. Which group of foreign-born residents in the UK had the largest increase in population over the last decade?
    (1) Polish-born
    (2) Chinese-born
    (3) Indian-born
    (4) Nigerian-born

2. In what level is the current unemployment rate in the UK?
    (1) Lower than 7.0%
    (2) 7.0-8.5%
    (3) 8.6-10.0%
    (4) 10.1% or higher

3. Which party do you think this logo presents?

    (1) Conservative
    (2) Labour
    (3) Liberal Democrat
    (4) Scottish National Party
    (5) Plaid Cymru
    (6) Green Party

4. Which one of the following best describes the Alternative Voting (a.k.a. preferential voting) system?
    (1) Each voter has the chance to rank the candidates in order of preference.
    (2) Each voter votes for parties instead of for individual candidates.
    (3) Each voter has as many votes as there are choices, and can distribute those votes as desired.

5. Please choose the party or parties from the list below that are currently in the Cabinet. You may mark one or more parties.
    (1) Conservative
    (2) Labour
    (3) Liberal Democrat
    (4) Scottish National Party

(5) Plaid Cymru
(6) Green Party

6. From which of the following parties does the current Prime Minister come?
    (1) Conservative
    (2) Labour
    (3) Liberal Democrat
    (4) Scottish National Party
    (5) Plaid Cymru
    (6) Green Party

7. Identify the political party affiliation of Nick Clegg?
    (1) Conservative
    (2) Labour
    (3) Liberal Democrat
    (4) Scottish National Party
    (5) Plaid Cymru
    (6) Green Party

8. Identify the political party affiliation of Natalie Bennett?
    (1) Conservative
    (2) Labour
    (3) Liberal Democrat
    (4) Scottish National Party
    (5) Plaid Cymru
    (6) Green Party

9. There are five parties below. Please rank-order the parties from the one that currently has the most seats to the least seats in the House of Commons.
    (1) Conservative
    (2) Labour
    (3) Liberal Democrat
    (4) Democratic Unionist Party
    (5) Scottish National Party

Each question is followed by the confidence rating question below. A pair of factual and confidence rating questions are shown on the same page.

How confident are you that your answer is correct?

	0	10	20	30	40	50	60	70	80	90	100
%											
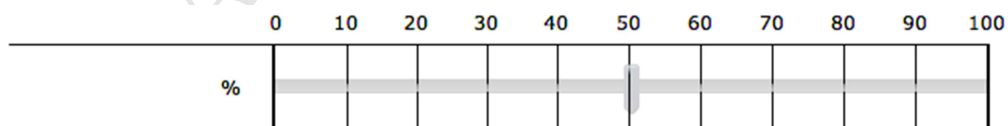
Reference

Alvarez, R. Michael, and Charles H. Franklin. 1994. "Uncertainty and Political Perceptions." *The Journal of Politics* 56(3): 671–88.

Armstrong II, David A. et al. 2014. *Analyzing Spatial Models of Choice and Judgment with R*. Boca Raton, FL: CRC Press.

Bakker, Ryan et al. 2012. "Measuring party positions in Europe: The Chapel Hill expert survey trend file, 1999-2010." *Party Politics* 21(1): 1–15.

Bartels, Larry M. 1986. "Issue Voting Under Uncertainty: An Empirical Test." *American Journal of Political Science* 30(4): 709–28.

———. 1996. "Uninformed Votes: Information Effects in Presidential Elections." *American Journal of Political Science* 40: 194–230.

Bassili, John N. 1996. "Meta-Judgmental Versus Operative Indexes of Psychological Attributes: The Case of Measures of Attitude Strength." *Journal of Personality and Social Psychology* 71(4): 637–53.

Berinsky, Adam J. 2015. "Rumors and Health Care Reform: Experiments in Political Misinformation." *British Journal of Political Science* OnlineFirst.

Bode, Leticia, and Emily K. Vraga. 2015. "In Related News, That Was Wrong: The Correction of Misinformation Through Related Stories Functionality in Social Media." *Journal of Communication* 65(4): 619–38.

Brucks, Merrie. 1985. "The on Effects of Product Search Class Knowledge Information Behavior." *Journal of Consumer Research* 12(1): 1–16.

Cervone, Daniel, and Philip K. Peake. 1986. "Anchoring, Efficacy, and Action : The Influence of Judgmental Heuristics on Self-Efficacy Judgments and Behavior." *Journal of Personality and Social Psychology* 50(3): 492–501.

Clausen, Aage R. 1977. "The accuracy of leader perceptions of constituency views." *Legislative Studies Quarterly* 2(4): 361–84.

Clausen, Aage R., Soren Holmberg, and Lance DeHaven-Smith. 1983. "Contextual Factors in the Accuracy of Leader Perceptions of Constituents' Views." *The Journal of Politics* 45(2): 449–72.

Clifford, Scott, and Jennifer Jerit. 2016. "Cheating on Political Knowledge Questions in Online Surveys." *Public Opinion Quarterly* 80 (4): 858-887.

Dancey, Logan, and Geoffrey Sheagley. 2013. "Heuristics Behaving Badly: Party Cues and Voter Knowledge." *American Journal of Political Science* 57(2): 312–25.

Delli Carpini, Michael, and Scott Keeter. 1993. "Measuring Political Knowledge: Putting First Things First." *American Journal of Political Science* 37(4): 1179–1206.

———. 1996. *What Americans Know about Politics and Why it Matters.* New Haven, CT: Yale University Press.

Dolan, Kathleen. 2011. "Do Women and Men Know Different Things? Measuring Gender Differences in Political Knowledge." *The Journal of Politics* 73(1): 97–107.

Dow, Jay K. 2009. "Gender Differences in Political Knowledge." *Political Behavior* 31(1): 117–36.

Ellen, Pam Scholder. 1994. "Do we know what we need to know? Objective and subjective knowledge effects on pro-ecological behaviors." *Journal of Business Research* 30: 43–52.

Fazio, Russell H. 1990. "A practical guide to the use of response latency in social psychological research." In *Research Methods in Personality and Social Psychology*, eds. C. Hendrick and M.S. Clark. Newbury Park, CA: Sage Publications, 74–97.

Fazio, Russell H., Jeaw-mei Chen, Elizabeth C. McDonel, and Steven J. Sherman. 1982. "Attitude Accessibility, Attitude-Behavior Consistency, and the Strength of the Object-Evaluation Association." *Journal of Experimental Social Psychology* 18(4): 339–57.

Fox, Jean-Paul. 2010. *Bayesian item response modeling: Theory and applications*. Springer.

Fox, Jean-Paul, and Cees A. W. Glas. 2003. "Bayesian Modeling of Measurement Error in Predictor Variables Using Item Response Theory." *Psychometrika* 68(2): 169–91.

Galston, Willam A. 2001. "Political Knowledge, Political Engagement, and Civic Education." *Annual review of political science* 4: 217–34.

Glasgow, Garrett, and R. Michael Alvarez. 2000. "Uncertainty and Candidate Personality Traits." *American Politics Research* 28(1): 26–49.

Higgins, E. T., and G. King. 1981. "Accessibility of Social Constructs: Information Processing Consequences of Individual and Contextual Variability." In *Personality, Cognition, and Social Interaction*, eds. N. Cantor and J. Kihlstrom. Hillsdale, NJ: Lawrence Erlbaum Associates, 69–121.

Hochschild, Jennifer L., and Katherine Levine Einstein. 2015. "'It Isn't What We Don't Know that Gives Us Trouble, It's What We Know that Ain't So:' Misinformation and Democratic Politics." *British Journal of Political Science* 45(3): 467–75.

Hollyer, J. R., B. P. Rosendorff, and J. R. Vreeland. 2014. "Measuring Transparency." *Political Analysis* 22(4): 413–34.

Huckfeldt, Robert, Jeffrey Levine, William Morgan, and John Sprague. 1999. "Accessibility and the Political Utility of Partisan and Ideological Orientations." *American Journal of Political Science* 43(3): 888–911.

Huckfeldt, Robert, Jeffery J. Mondak, Michael Craw, and Jeanette Morehouse Mendez. 2005. "Making sense of candidates: partisanship, ideology, and issues as guides to judgment." *Cognitive Brain Research* 23(1): 11–23.

Jackman, Simon. 2009. *Bayesian Analysis for the Social Sciences*. Wiley.

Jensen, Carsten, and Jens Peter Frølund Thomsen. 2014. "Self-reported cheating in web surveys on political knowledge." *Quality and Quantity* 48: 3343–54.

Jerit, Jennifer, Jason Barabas, and Toby Bolsen. 2006. "Citizens, Knowledge, and the Information Environment." *American Journal of Political Science* 50(2): 266–82.

Junker, Brian, Lynne Steuerle Schofield, and Lowell J. Taylor. 2012. "The use of cognitive ability measures as explanatory variables in regression analysis." *IZA Journal of Labor Economics* 1(1996): 1–19.

Keeter, Scott. 2008. "Political Knowledge." In *Encyclopedia of Survey Research Methods*, ed. Paul J. Lavrakas. Sage Publications, Inc., 587–88.

Koch, Jeffrey W. 2003. "Being Certain Versus Being Right: Citizen Certainty and Accuracy of House Candidates' Ideological Orientations." *Political Behavior* 25(3): 221–46.

Kuklinski, James H. et al. 2000. "Misinformation and the Currency of Democratic Citizenship." *Journal of Politics* 62(3): 790–816.

Lau, Richard R., and David P. Redlawsk. 1997. "Voting Correctly." *American Political Science Review* 91(3): 585–98.

Lau, Richard R., Parina Patel, Dalia F. Fahmy, and Robert R. Kaufman. 2014. "Correct Voting Across Thirty-Three Democracies: A Preliminary Analysis." *British Journal of Political Science* 44(2): 239–59.

Lavine, Howard, Eugene Borgida, and John L. Sullivan. 2000. "On the Relationship Between Attitude Involvement and Attitude Accessibility." *Political Psychology* 21(1): 81–106.

Levendusky, Matthew S., and Simon Jackman. 2003. "Reconsidering the Measurement of Political Knowledge."

Lewandowsky, Stephan et al. 2012. "Misinformation and Its Correction: Continued Influence and Successful Debiasing." *Psychological Science in the Public Interest* 13(3): 106–31.

Lewandowsky, Stephan, Werner G K Stritzke, Klaus Oberauer, and Michael Morales. 2005. "Memory for fact, fiction, and misinformation: the Iraq War 2003." *Psychological science* 16(3): 190–5.

Luskin, Robert C. 1990. "Explaining political sophistication." *Political Behavior* 12(4): 331–61.

Maurer, Marcus, and Carsten Reinemann. 2006. "Learning Versus Knowing: Effects of Misinformation in Televised Debates." *Communication Research* 33(6): 489–506.

Miller, Melissa K., and Shannon K. Orr. 2008. "Experimenting with a 'Third Way' in Political Knowledge Estimation." *Public Opinion Quarterly* 72(4): 768–80.

Mondak, Jeffery J. 2000. "Reconsidering the Measurement of Political Knowledge." *Political Analysis* 8(1): 57–82.

———. 2001. "Developing Valid Knowledge Scales." *American Journal of Political Science* 45(1): 224–38.

Mondak, Jeffery J., and Mary R Anderson. 2003. "A Knowledge Gap or a Guessing Game?" *Public Perspective*: 6–9.

Mondak, Jeffery J., and Mary R. Anderson. 2004. "The Knowledge Gap: A Reexamination of Gender-Based Differences in Political Knowledge." *The Journal of Politics* 66(2): 492–512.

Mondak, Jeffery J., and Belinda Creel Davis. 2001. "Asked and Answered: Knowledge Levels When We Will Not Take "Don't Know" for an Answer." *Political Behavior* 23(3): 199–224.

Moorman, Christine, Kristin Diehl, David Brinberg, and Blair Kidwell. 2004. "Subjective Knowledge, Search Locations, and Consumer Choice." *Journal of Consumer Research* 31(3): 673–80.

Nadeau, Richard, and Richard G. Niemi. 1995. "Educated Guesses: The Process of Answering Factual Knowledge Questions in Surveys." *Public Opinion Quarterly* 59: 323–46.

Nyhan, Brendan. 2010. "Why the 'Death Panel' Myth Wouldn't Die: Misinformation in the Health Care Reform Debate." *The Forum* 8(1).

Nyhan, Brendan, and Jason Reifler. 2010. "When Corrections Fail: The Persistence of Political Misperceptions." *Political Behavior* 32(2): 303–30.

Park, C. Whan, David L. Mothersbaugh, and Lawrence Feick. 1994. "Consumer knowledge assessment." *Journal of consumer research* 21(1): 71–82.

Pasek, Josh, Gaurav Sood, and Jon A. Krosnick. 2015. "Misinformed About the Affordable Care Act? Leveraging Certainty to Assess the Prevalence of Misperceptions." *Journal of Communication* 65(4): 660–73.

Pears, David. 1971. *What Is Knowledge?* New York: Harper & Row.

Radecki, Carmen M., and James Jaccard. 1995. "Perceptions of Knowledge, Actual Knowledge, and Information Search Behavior." *Journal of Experimental Social Psychology* 31: 107–38.

Raju, P. S., Subhash C. Lonial, and W Glynn Mangold. 1995. "Differential effects of subjective knowledge, objective knowledge, and usage experience on decision making." *Journal of Consumer Psychology* 4(2): 153–80.

Rivers, Douglas. 2003. "Identification of Multidimensional Spatial Voting Models." Typescript, Stanford University.

Sanders, Mitchell S. 2001. "Uncertainty and Turnout." *Political Analysis* 9(1): 45–57.

Schacter, Daniel L. 1983. "Feeling of knowing in episodic memory." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 9(1): 39–54.

Solt, Frederick. 2008. "Economic Inequality and Democratic Political Engagement." *American Journal of Political Science* 52(1): 48–60.

Strube, Gerhard. 1987. "Answering Survey Questions: The Role of Memory." In *Social Information Processing and Survey Methodology*, eds. Hans-J. Hippler, Norbert Schwarz, and Seymour Sudman. Springer.

Sturgis, Patrick, Nick Allum, and Patten Smith. 2008. "An Experiment on the Measurement of Political Knowledge in Surveys." *Public Opinion Quarterly* 72(1): 90–102.

Tversky, Amos, and Daniel Kahneman. 1974. "Judgment under Uncertainty: Heuristics and Biases." *Science* 185(4157): 1124–31.

Van Deth, Jan W., and Martin Elff. 2004. "Politicisation, economic development and political interest in Europe." *European Journal of Political Research* 43(3): 477–508.

Verba, Sidney, Nancy Burns, and Kay Lehman Schlozman. 1997. "Knowing and Caring about Politics: Gender and Political Engagement." *Journal of Politics* 59(4): 1051–72.