

Pathways to Substantive Representation: Policy Congruence and Policy Knowledge among Canadian Local Politicians*

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Abstract

In recent years, new data and methods have reinvigorated research on two central elements of elite political behavior: politicians' *congruence with* and *knowledge of* citizens' opinions. Here, we survey over 700 elected officials in Canada to investigate and quantify the relationship between congruence (i.e. politicians' alignment with constituents' attitudes) and knowledge (i.e. politicians' accurate perception of constituents' attitudes) as pathways to substantive representation. We find that they are strongly related: congruent politicians also tend to have accurate perceptions of their constituents' opinions. Individual and contextual correlates of success on each of the two pathways are very similar, but politicians' performance varies considerably across policy issues. We discuss three main implications of our findings: congruence and perceptual accuracy as components of a single pathway to substantive representation; the need to better understand variation in congruence and perceptual accuracy across policy issues and policy-related factors; and the quality of substantive representation in contemporary democracies.

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1 Introduction

How do politicians represent their citizens’ policy preferences? For sixty years, political scientists have answered this question by pointing to two pathways through which public preferences are reflected in a representative’s behaviour: a congruence pathway, in which citizens’ views are reflected by a representative because the representative *shares* those views, and a perception pathway, in which citizens’ views are reflected by a representative because the representative *knows* those views and can then act on them (Miller and Stokes, 1963). The outcome of successful representation along either pathway is assumed to be the same: politicians who produce policy in line with voter preferences.

In recent years, political scientists have reinvigorated research on both of these representational pathways, using new datasets and statistical estimation techniques to make important gains in our understanding of both congruence and knowledge among political elites (Broockman and Skovron, 2018; Eichenberger, Varone and Helfer, 2021; Lupu and Warner, 2021; Varone and Helfer, 2021; Sevenans, Soontjens and Walgrave, 2021). These research agendas have generally proceeded in parallel, as the political science community worked to develop the tools with which to assess the character and quality of each of the two pathways in contemporary democratic politics. Having done so, we are now in a good position to return to a set of questions that originally animated the typology itself: are the two pathways in fact *distinct* roads to the same destination? Does representation primarily occur along the first pathway for some politicians, and the second pathway for others? Or are politicians who perform well on one pathway also strong on the other?

In this paper, we explore these questions using novel data from politicians and their constituents in hundreds of Canadian local governments. We combine data on nine policy issues from a large-scale public opinion survey with a survey of more than 700 mayors and councillors to assess and compare the quality of both congruence and knowledge among these politicians, where congruence is defined as politicians’ alignment with their constituents’ preferences, and knowledge is defined as the accuracy of politicians’ perception of those

preferences. Using a method adapted from Miguel Pereira (2021), we compare politicians' congruence and perceptual accuracy directly. We find that congruence and knowledge are in fact strongly related: most politicians perform well on both congruence and knowledge (58%), and many of those who perform poorly do so on both pathways (22%). Fewer than one fifth of politicians (19%) do well on one pathway but not the other. Moreover, the individual and contextual correlates of weak or strong performance are very similar for both pathways, meaning that congruence and knowledge are similarly explained by the same factors. For most politicians, congruence and knowledge go hand in hand, and the presence of these qualities appears to be related less to individual characteristics than to the policy issue under consideration, which accounts for most of the variance we observe in congruence-knowledge overlap.

These findings have important implications for theories of substantive representation. Above all, they illustrate the close connection between congruence and knowledge among the active elected politicians in our study; rather than being complementary mechanisms through which policy representation is realized, in which success on one pathway might compensate for failure on the other, we find a strong relationship between the two (Mansbridge, 2009). This suggests the need for new theoretical work on the causal processes that produce such strong convergence across pathways, the policy consequences of failures of congruence and/or knowledge, and the electoral consequences for politicians who are successful on both pathways when compared to the minority who perform well on just one. Perhaps most importantly, however, we argue that the profound variation in politicians' performance on both pathways across policy issues illustrates the need for theories of policy representation that focus less on congruence versus knowledge and more on the factors that are related to greater or lesser representational success *across* issues. We document one such factor in our analysis – the uniformity of public opinion among a politician's constituents – along with considerable variation in representational performance across issue domains. We conclude with a discussion of the implications of these findings for future research on elite behaviour, with a

particular focus on the need for research designs that are equipped to examine congruence and knowledge across many policy issues and issue domains.

2 Politicians and Public Opinion

In their foundational study of modern representation, Miller and Stokes (1963) describe two pathways by which citizens' preferences might be reflected in a representative's behaviour. In the first pathway, politicians reflect citizens' preferences in their legislative activity because they *agree* with their constituents' views. In the second pathway, politicians reflect citizens' preferences not necessarily because they agree, but because they are aware of their constituents' views and choose to represent them. Miller and Stokes also acknowledge that the two pathways may interact: knowledge may affect agreement if politicians, after learning citizens' attitudes, change their own positions, and agreement might affect knowledge if politicians' own views colours their perception of constituents' opinions. Empirically, Miller and Stokes document a strong correlation ($r=0.66$) between agreement and knowledge among the politicians they study, which they discuss in terms of these interacting mechanisms but largely leave unexplored.

The Miller-Stokes framework continues to have an enormous influence on substantive representation research, continuing to inform both theoretical debates (Mansbridge, 2003, 2009) and empirical research (E.g. Broockman and Skovron, 2018; Walgrave et al., 2023; Lupu and Warner, 2021). However, despite dozens of recent studies that have been carried out on each of the two pathways in the Miller-Stokes framework, one important theoretical question has generally been neglected: the relationship between the pathways. While earlier research focused on the relative strength of the two pathways – motivated in part by theories of representational roles then emerging in the political science literature (Erikson, Luttbeg and Holloway, 1975; Hedlund and Friesema, 1972; McCrone and Kuklinski, 1979) – more recent research has tended to focus on congruence *or* knowledge as distinct quantities of in-

terest, along with work on the mechanisms that implicitly connect congruence to knowledge: politicians’ tendency to assume that their constituents share their own preferences (Pereira, 2021; Kertzer et al., 2020), and how public opinion prompts politicians to shift their attitudes into alignment with the public (Sevenans, Soontjens and Walgrave, 2021; Dynes, Karpowitz and Monson, 2022; Kalla and Porter, 2019; Loewen, Rubenson and McAndrews, 2021).

These recent studies support the original intuition articulated by Miller and Stokes that congruence and knowledge may be closely connected, rather than distinct pathways. Nevertheless, none of these studies explicitly investigates the correlation between these qualities or the distribution of ‘good’ performance on congruence and knowledge among politicians. Nor do any of these studies explore why some politicians perform well on both while others do not.

2.1 Research Questions

In what follows, we adapt a measurement approach suggested by Pereira (2021) to enable as direct as possible a comparison of politicians’ performance on both congruence *and* knowledge. We focus on three interrelated research questions. First, and most simply, we want to understand congruence and perceptual accuracy among politicians – that is, their overall representational success on each pathway. These descriptive findings add relevant comparative data to scholarship on politicians’ congruence with and knowledge of their constituents and contribute directly to our understanding of if and how democratic representation is realized.

Second, we describe the *relationship* between congruence and perceptual accuracy. Treating each pathway separately leaves open the possibility that representational failure in one pathway can be balanced by representational success in the other; politicians might make up for their failure of congruence with more effort to understand their constituents’ preferences, or their perceptual failures may be less relevant due to their shared preferences with constituents. We use politicians’ performance on *both* congruence and perceptual accuracy across nine distinct policy issues to explicitly test the relationship between the two pathways.

Across these issue domains, we compare how well politicians perform on each pathway. Because performance on each pathway can be classified as relatively ‘good’ or ‘bad’ (we explain below how we define these terms), we also assess the share of politicians who belong to the resulting four ‘types’ of pathways performance: poor congruence and poor knowledge, poor congruence and good knowledge, good congruence and poor knowledge, and good performance on both pathways. Finally, our data enable us to explore politicians’ performance on both pathways across a diverse range of issues.

We expect to find a strong correlation between congruence and knowledge; that is, we expect good congruence to go hand in hand with good knowledge. This expectation is in line with the empirical findings in Miller and Stokes’s original study, as well as more recent findings on the role of social projection in politicians’ perception of public opinion – that is, if politicians tend to project their opinions onto their constituents, then politicians who *agree* with their constituents are also more likely to perform well on knowledge tasks (Sevenans et al., 2021). This expectation is further motivated by the documented tendency of politicians to shift their own positions to be more closely in line with the public’s, once they become aware of it (Sevenans, Soontjens and Walgrave, 2021).

Finally, we explore the *correlates* of congruence and knowledge. We pursue this analysis to provide an additional perspective on the relationship between the two pathways – if the correlates of congruence and knowledge behave similarly across the two pathways – that is, if the same individual or contextual conditions predict performance on both congruence and knowledge – this provides further evidence of a close connection between the two outcomes. To assess this possibility, we focus on the correlates outlined in Table 1: individual-level characteristics, municipal-level institutional differences, and issue-level variables. We emphasize that we include these models not so much to make definitive claims about the predictors of representational success, but rather to enable *comparison* of the correlates of congruence and perceptual accuracy as an additional test of their underlying similarity or difference as representational pathways. If the correlates of representational success are similar across the

two models, this would provide additional evidence for a “single pathway” interpretation of congruence and perceptual accuracy in practice. In addition, we also evaluate in a similar fashion whether belonging to one of the four aforementioned congruence/knowledge ‘types’ - good congruence / good knowledge, good congruence / poor knowledge, etc. - is predictable by our correlates of interest. Our purpose in this analysis is to provide further nuance on how the pathways relate to one another.

The correlates in Table 1 are by no means exhaustive, and we emphasize that we include the models not so much to make definitive claims about the predictors of representational success, but rather to enable *comparison* of the correlates of congruence and perceptual accuracy as an additional test of their underlying similarity or difference as representational pathways. It is notable, in our view, that our expectations about these variables from past research are quite similar across both pathways: another hint, perhaps, that the two pathways are more intimately related than the standard theoretical framework would have us believe. If the correlates of representational success are similar across the two models, this would provide additional evidence for a “single pathway” interpretation of congruence and perceptual accuracy in practice.

2.2 Substantive Representation in Municipal Government

Our analysis focuses on substantive representation in local governments. In Canada, elected mayors and councillors govern more than 3,000 distinct municipalities, which range in population from dozens to millions. We focus our attention on the 450 largest municipalities in Canada, which range in population from 10,000 to 2.9 million and include some 80 percent of the Canadian population. These municipalities are directly responsible for substantial areas of policy, including land use planning, roads and bridges, public transit, and policing. Many municipal politicians represent constituencies of similar size to their provincial and federal counterparts. These are, in short, elected politicians who face similar representational challenges to their counterparts at the state/provincial or federal levels.

Table 1: Correlates of Congruence and Knowledge: Description and Directional Expectations

| Variable | Research Findings | Expectation |
|--------------------|---|--|
| Individual | | |
| Elected At-Large | At-large politicians represent the population corresponding to our local estimates; ward politicians represent specific communities (Koop and Kraemer 2016). However, recent findings suggest at-large and ward councillors’ performance is quite similar (Lucas 2024; Tausanovitch and Warshaw, 2014). | Knowledge and congruence: higher scores among at-large councillors |
| Ideology | While mechanisms are not yet clear, recent studies suggest that politicians on the right perform more poorly on knowledge tests than politicians on the left (Broockman and Skovron 2018). | Knowledge: lower scores among right-leaning politicians; Congruence: uncertain |
| Time in Office | Little available research. Recently elected politicians may have been elected in competitive races, making them likely to be congruent and knowledgeable. But long-term politicians have had many opportunities to learn constituents’ preferences and citizens have had multiple opportunities to select (and de-select) them. | Knowledge and congruence: higher scores among longer-serving politicians |
| Municipal | | |
| Municipal Ideology | Politicians in more left-leaning or right-leaning municipalities should have similar congruence and knowledge scores, on average. However, heterogeneity of conservative preferences (Cochrane 2013) or generally left-leaning politicians (Lucas 2014) may make knowledge and congruence more challenging in more conservative municipalities. | Knowledge and congruence: uncertain |
| Partisan Election | Few clear partisan patterns in recent findings on knowledge and congruence (Tausanovitch and Warshaw 2014; Lucas 2024). However, politicians in partisan elections may have higher congruence and knowledge scores due to information advantages and coordination in partisan contests. | Knowledge: higher scores in partisan settings. Congruence: higher scores in partisan settings. |
| Population Size | Homogeneity of many smaller municipalities may make congruence and knowledge easier for politicians to achieve (Mansbridge 2009). However, politicians in larger municipalities may have access to more resources on constituents’ preferences. | Knowledge and congruence: uncertain |
| Issues | | |
| Issue Uniformity | When issue preferences are more uniform (i.e. closer to 0% or 100% support than 50%), politicians are more likely to share those preferences and to know their constituents’ preferences (Clausen et al. 1983; Sevenans 2023). | Knowledge and congruence: higher scores in more uniform settings. Congruence: uncertain |
| Individual Issues | Congruence and knowledge scores vary substantially across issues (Broockman and Skovron, 2018; Esaiasson and Holmberg 1996). | Knowledge and congruence: large and significant issue-level variation |

Given the sheer number of local governments and politicians, as well as theoretically interesting variation in population size, institutional structure, and local contexts, municipal politics has become an increasingly active site for studies of political representation and elite behaviour. These studies leverage the intersection of statistically well-powered samples and a population of subjects who face similar electoral incentives (and often decision making authority) to those at higher levels of government. Large-scale surveys of local and regional-level elected officials are frequently used to study central questions on democratic representation (e.g. Baekgaard et al., 2019; Lee, 2021; Öhberg and Naurin, 2016). When focusing on municipal representation, research in the United States has found good evidence of responsiveness between citizen attitudes and municipal policy outputs (Dynes, Karpowitz and Monson, 2022; Einstein and Kogan, 2016; Tausanovitch and Warshaw, 2014). Across local, state, and national levels, prominent research uses similar research designs to make inferences about representational biases, representational inequality, and representational success in contemporary democracies (Broockman, 2016; Pereira, 2021; Schaffner, Rhodes and La Raja, 2020).¹

This focus on municipal political representation is valuable for at least two reasons. The first, as we have noted above, is the significance of local governments themselves. New research has shown how important local governments are for understanding broader questions of racial discrimination, representational inequality, and even the emergence of far-right politics (Fitzgerald, 2018; Schaffner, Rhodes and La Raja, 2020). Second, municipal governments offer opportunities for researchers to explore questions that are often inaccessible at other levels of government. In many countries, local governments feature considerable variation in their institutional structures, both over time and across space, including partisan and non-partisan elections, district and at-large elections, and widely varying population sizes. All told, variation in socio-demographic, political-cultural, and institutional contexts is enormous. Leveraging this variation opens opportunities to explore important questions

¹In Canada, recent studies along these lines have reinforced these studies in the USA and Europe. See Lucas (2022); Lucas and Armstrong II (2021).

in political science about the relationships between local contexts, political institutions, and representational quality.

3 Data and Methods

We use two original datasets in our analysis. The first is the Digital Democracy Project (DDP), a large survey of citizens that was collected during Canada’s 2019 federal election. Table 2 summarizes the nine issue questions in the survey; notice that five are framed as federal government responsibilities, and four are framed as municipal government responsibilities. In total, we collected well over 10,000 responses to these questions, along with the necessary socio-demographic information for the municipal opinion estimation procedure described below. This was one of the largest political science surveys ever conducted in Canada, and among the largest national surveys of specifically municipal policy attitudes ever collected.²

Table 2: Overview of Survey Questions

| Question | Responses | Proportion Agree |
|---|-----------|------------------|
| Do you think the federal government should: | | |
| Ban handguns and assault weapons | 10339 | 0.76 |
| Continue with the carbon tax | 10339 | 0.41 |
| Increase funding for public transit infrastructure | 10339 | 0.68 |
| Raise income taxes on people earning more than \$200,000 | 10339 | 0.74 |
| Increase trade with China | 10339 | 0.40 |
| Do you think your municipal government should: | | |
| Encourage more immigrants to settle in your municipality | 10339 | 0.34 |
| Give tax breaks to businesses that move to the municipality | 10339 | 0.48 |
| Subsidize public transit for low-income people | 10339 | 0.73 |
| Create stricter rules to limit urban sprawl | 10339 | 0.49 |

Our second data source is the Canadian Municipal Barometer, an annual survey of elected

²The largest studies of municipal policy attitudes include Cann (2018), who included eleven local issues in a survey of 1,000 Americans, and Tausanovitch and Warshaw (2014), whose analysis incorporates fourteen municipal policy questions drawn from the 2012 CCES. Even in specific cities, surveys of municipal policy attitudes are rare; an important exception is Boudreau, Elmendorf and MacKenzie (2015).

mayors and councillors in the nearly 450 Canadian municipalities described above. For each of the nine issue questions, we asked two corresponding questions of elected representatives: the percentage of residents in the politician’s municipality who would support the statement, and the politician’s own position on the issue. Nearly 800 politicians completed the relevant questions in the 2020 CMB annual survey, for a response rate of 22%, a very strong response rate for a survey of political elites.³ In the online supplementary material, we show that our respondents are broadly representative of the larger population of municipal politicians on observable characteristics such as gender, municipal population size, and region.

To compare politicians’ perceptions and attitudes to their constituents, we need to translate our national public opinion data into local estimates. To do so, we use multilevel regression and poststratification (MRP), a well-established technique for generating local estimates from national survey samples (Lax and Phillips, 2009; Tausanovitch and Warshaw, 2013). We implement the MRP model in a fully Bayesian setting, enabling simple post-estimation calculation of uncertainty intervals for each of our estimates of issue support in each municipality. We then propagate this uncertainty through our subsequent results, which ensures that our findings are robust to underlying uncertainty about municipal-level public opinion.⁴ We provide additional information on our MRP model in the supplementary appendix, along with a description of our procedure for incorporating measurement uncertainty in subsequent results.

Having calculated average issue positions in each municipality, we then turn our attention to the politician survey, calculating our two quantities of interest: congruence with local opinion and knowledge of local opinion. For each policy issue, congruence is coded (1) when a politician’s position aligns with the majority in their municipality and (0) when it does

³For comparison, Broockman and Skovron (2018) report a response rate of 20.8% in an American national candidate survey, a rate they describe as “substantially higher than most elite surveys and surveys of the general public” (545). Surveys of elites in other countries report response rates that rarely exceed 20%; see, for instance, Bailer (2014); Deschouwer and Depauw (2014); Walgrave and Joly (2018). A recent study of municipal representatives by Bucchianeri et al. (2021) reported a response rate of 12%.

⁴See Treier and Jackman (2008) for a general discussion of the importance of incorporating measurement uncertainty in subsequent analysis.

not. Knowledge of public opinion is coded (1) when the politician correctly estimates the majority position in their municipality – that is, when their estimate is on the correct side of 50%. This quantity, first proposed and used by Pereira (2021), nicely captures the intuition that we care about politicians’ knowledge of the majority view among their constituents. It also creates an attractive dichotomous measure of knowledge for each politician-issue that is directly comparable to congruence.⁵

After comparing politicians’ performance on congruence and knowledge directly, we then explore the individual and contextual correlates of these quantities, with a focus on assessing similarities and differences across the two representational pathways. We use politicians’ self-reported time in office as our political experience variable. We measure individual ideology using a standard left-right self-placement question. We measure each politician’s district type and position (ward council, at-large council, mayor) using two questions from the survey itself, which we then manually validated using municipal websites; in total, 52% of our respondents are ward councillors, 31% are at-large councillors, and 17% are mayors.⁶ We measure partisan local competition with a similar combination of survey questions and manual validation, with 83% of respondents competing in non-partisan elections and 17% in partisan elections. Finally, our measure of population size is the log-transformed 2016 census population for each municipality.

Because our theoretical quantity of interest is dichotomous and measured at the level of an individual politicians’ alignment or knowledge on an individual policy issue, we employ a multilevel logit model with varying intercepts for each policy issue, municipal politician, and municipality. We implement this model in a Bayesian framework, enabling simple calculation of coefficients and credible intervals for both individual-level and municipality-level correlates. We also assess the correlates of belonging to the four resulting congruence/knowledge

⁵In the supplementary material (SM2 and SM6), we replicate our main findings using continuous rather than dichotomous measures of congruence and knowledge.

⁶Because we are asking questions of *municipal* rather than district opinion, some may worry that the results are unduly influenced by the inclusion of a large number of ward councillors, who may know more about ward than municipal opinion. We show in the supplementary material (SM7) that our main results are substantively identical when ward councillors are removed from the analysis.

‘types’ that emerge from our classification of politicians to good/bad performers on either pathway. Because we are exploring the predictors of sorting into four distinct and mutually exclusive outcomes (being a ‘good congruence / good knowledge’, ‘good congruence / poor knowledge’ type, and so on), we estimate Bayesian multilevel multinomial logit models with the types as outcomes and the same correlates described above.

Like other contemporary studies of municipal representation, our empirical analysis has several moving parts. In its essence, however, our task is simple. First, we make a best estimate of each municipality’s average support for nine policy issues. We then compare these estimates to politicians’ own opinions (congruence) and their perception of local opinion (knowledge). We use the resulting scores to explore how well politicians perform on the two representational pathways, the relationship between the two pathways, and, to further clarify similarities or differences between the two pathways, the individual and municipal characteristics that are correlated with representational success on each representational pathway and on politicians’ combined congruence-knowledge performance types.

4 Results

We begin with Figure 1, which summarizes the proportion of politicians whose opinion is congruent with the majority in their municipality (green bars) and who correctly perceive the majority position in their municipality (purple bars). Error bars are 95% credible intervals for the congruence and knowledge scores for each issue after incorporating uncertainty in the municipal public opinion estimates. A few patterns are immediately clear in the figure. First, while overall congruence and perceptual accuracy is quite high – 68% for congruence and 66% for knowledge, similar to the low-70% scores among Swedish and Swiss politicians in Pereira (2021) – variation among the policy issues is striking. In some cases, such as federal transit funds, perceptual accuracy is excellent and congruence is nearly perfect, reflecting overwhelming support for federal transit funding among both politicians and the public –

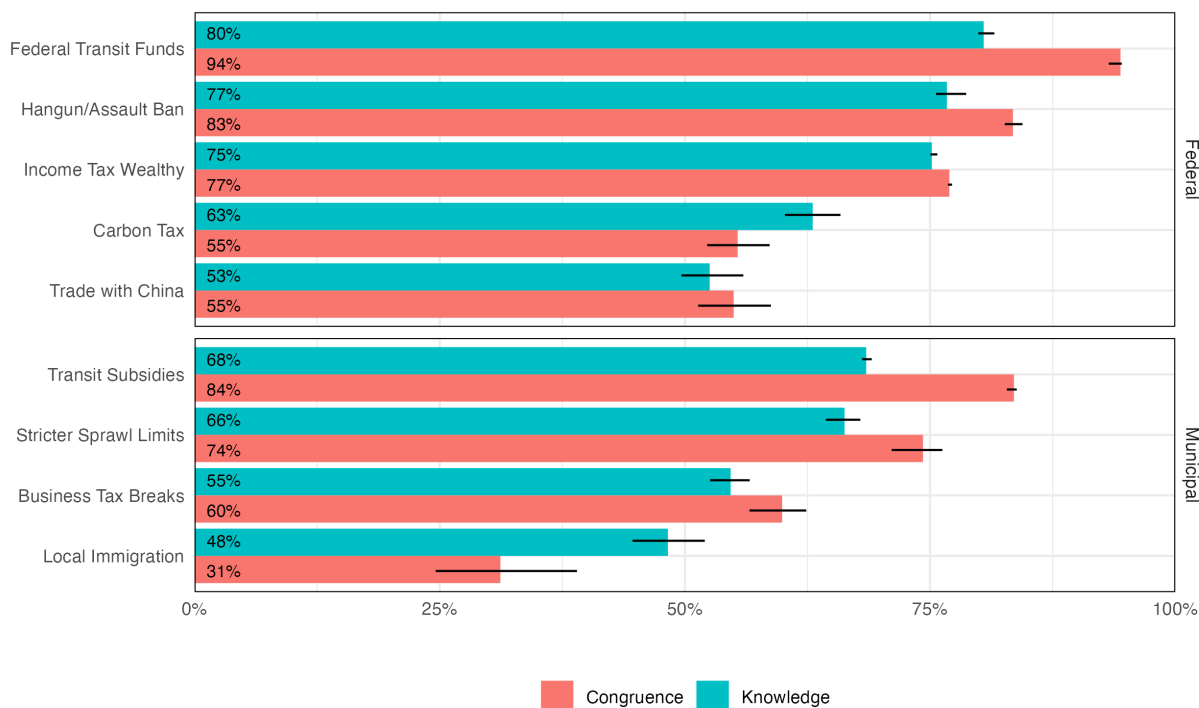


Figure 1: **Congruence and Knowledge, By Issue.** Politicians’ congruence scores (in red) and knowledge scores (in blue) for each issue. Horizontal axis is the percentage of politicians who align with (congruence) or know (knowledge) the majority position in their municipality. Issues sorted by level of government responsible. Whiskers are 95% credible intervals.

an easy issue for politicians to “get right”. In other cases, such as carbon taxes, trade with China, and, most strikingly, local immigrant settlement, congruence and perceptual accuracy scores are much lower. These poor scores reflect a number of potential sources of representational failure: in the case of carbon taxes, a highly contentious issue with strong views on both sides; in the case of trade with China, a much less salient issue, with more uncertain preferences among both the public and politicians; and in the case of immigration, an issue in which the general public and political elites simply disagree. Overall, what is most clear in Figure 1 is that politicians’ performance on congruence and perceptual accuracy is far from uniform across issues.⁷

One factor that is *not* strongly related to politicians’ congruence and knowledge scores is

⁷Approximately 20% of the variance in congruence and 7% of the variance in knowledge is explained by issues alone.

our framing of the issue as federal or municipal in character. While overall scores for federal issues are slightly higher than for municipal issues, what is most obvious in Figure 1 is the variation *within* rather than *across* levels of government. Neither the issue ownership nor the issue nationalization argument is obviously supported by these results; what matters, it would seem, is the character of the issue itself, rather than the level of government responsible for that issue.

Notice, finally, the clear relationship between congruence and knowledge in the figure: when congruence scores are strong, perceptual accuracy scores are also strong. On seven of the nine issues, politicians perform slightly better on perceptual accuracy than congruence, though the differences between the two are generally modest. In just one case, local immigrant settlement, do we see a dramatic difference between congruence and knowledge, with nearly half of politicians correct in their knowledge of constituents' attitudes, but less than a quarter congruent with those attitudes. Immigration appears to be an area of substantial disjuncture between elite and public preferences (Walgrave et al., 2023), with strong support for local immigrant settlement among municipal political elites, and considerably more hesitancy among constituents.

The results in Figure 1 suggest that congruence and knowledge, far from being alternative pathways, are in practice strongly related to one another. Figure 2 confirms this relationship by plotting each politician's congruence and accuracy scores.⁸ The relationship is strong, positive, and statistically significant ($r=.48$, $p<.01$); politicians with good overall congruence scores tend to have very good perceptual accuracy scores as well. In general, politicians tend either to perform well on both congruence and knowledge (61% of politicians perform well on both pathways), or perform poorly on both (14% of politicians), with only a quarter of politicians in our sample performing well on one pathway but not the other.

Finally, Figure 3 summarizes the correlates of congruence and perceptual accuracy.⁹

⁸The scores are the proportion of each politicians' issue positions that are congruent with their locality out of the nine issues they responded to, and the proportion of politicians' accurate assessment of public opinion on these issues out of the nine assessments they made.

⁹We provide a visual summary of the bivariate relationships for each DV and correlate in the supplement.

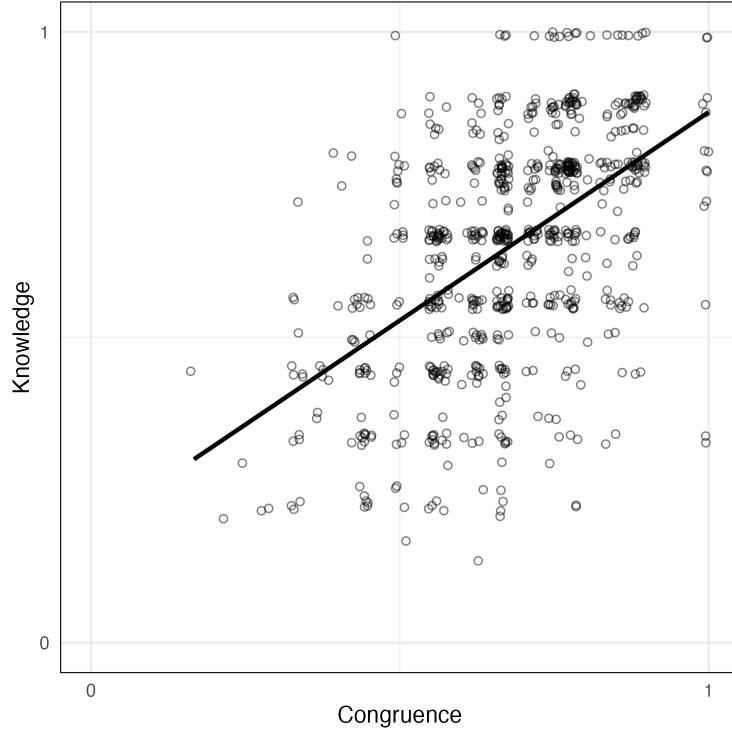


Figure 2: **Relationship Between Congruence and Perceptual Accuracy.** Politicians' congruence scores on the horizontal axis, and knowledge scores on the vertical axis. Scores rescaled to range between zero and one.

We plot each variable's estimated marginal effect, holding other variables at their median values. All variables are rescaled to range between zero and one; each effect can therefore be interpreted as the expected difference in the probability of congruence or perceptual accuracy when comparing individuals at the minimum and maximum values of the variable of interest and who are at the median values of all other variables.

For our purposes, what is most important about the results in Figure 3 is the consistency of the correlates across the two models: with just one exception (partisan elections), the coefficients are identical in direction and significance, and similar in magnitude. In neither model is politicians' years of service associated with congruence or perceptual accuracy; we thus find no support for the view that increased time in office improves performance, nor for the view that politicians become disconnected from constituents over time.

tary material (Figure SM.1).

The two position coefficients, at-large councillor and mayor (with ward councillors as the base category), suggest that congruence varies little by a politician’s district type or position. Ward and at-large councillors are nearly identical in congruence and knowledge – a striking finding, given that we are using municipal public opinion estimates to calculate the congruence and accuracy scores. Whatever representational gains may be associated with ward representation, they appear not to come at the cost of representational weakness for the municipality as a whole. This finding adds further weight to growing evidence that the consequences of at-large and ward representation for substantive representation are minimal (Lucas and Armstrong II, 2021; Tausanovitch and Warshaw, 2014), even if their consequences for descriptive representation or representational focus remain significant (Koop, 2016; Welch and Bledsoe, 1990).

In contrast to politicians’ district type, their ideology *is* associated with both congruence and perceptual accuracy. On average, politicians at the right-wing end of the ideological self-placement spectrum are substantially less likely than those at the left-wing end of the spectrum to be either congruent with or correctly perceive their constituents. This finding aligns with past work in the United States (Broockman and Skovron, 2018; Lax, Phillips and Zelizer, 2019), suggesting that the representational challenges faced by very conservative politicians may be more general than a specific jurisdictional context. In the supplementary material (SM2), we show that *all* politicians tend to perform less-well in right-leaning municipalities. Given that there are more right-wing politicians in right-wing municipalities, this helps to explain at least some of the ideological difference in performance: there is something more “difficult” about congruence and knowledge in right-wing municipalities than in left-wing municipalities. These individual and contextual ideological differences are an important priority for further research.

In neither model is municipal population size a substantively large or significant correlate of representational success. While politicians in large municipalities tend to represent a larger number of constituents, they are also supported by a more robust media environment, more

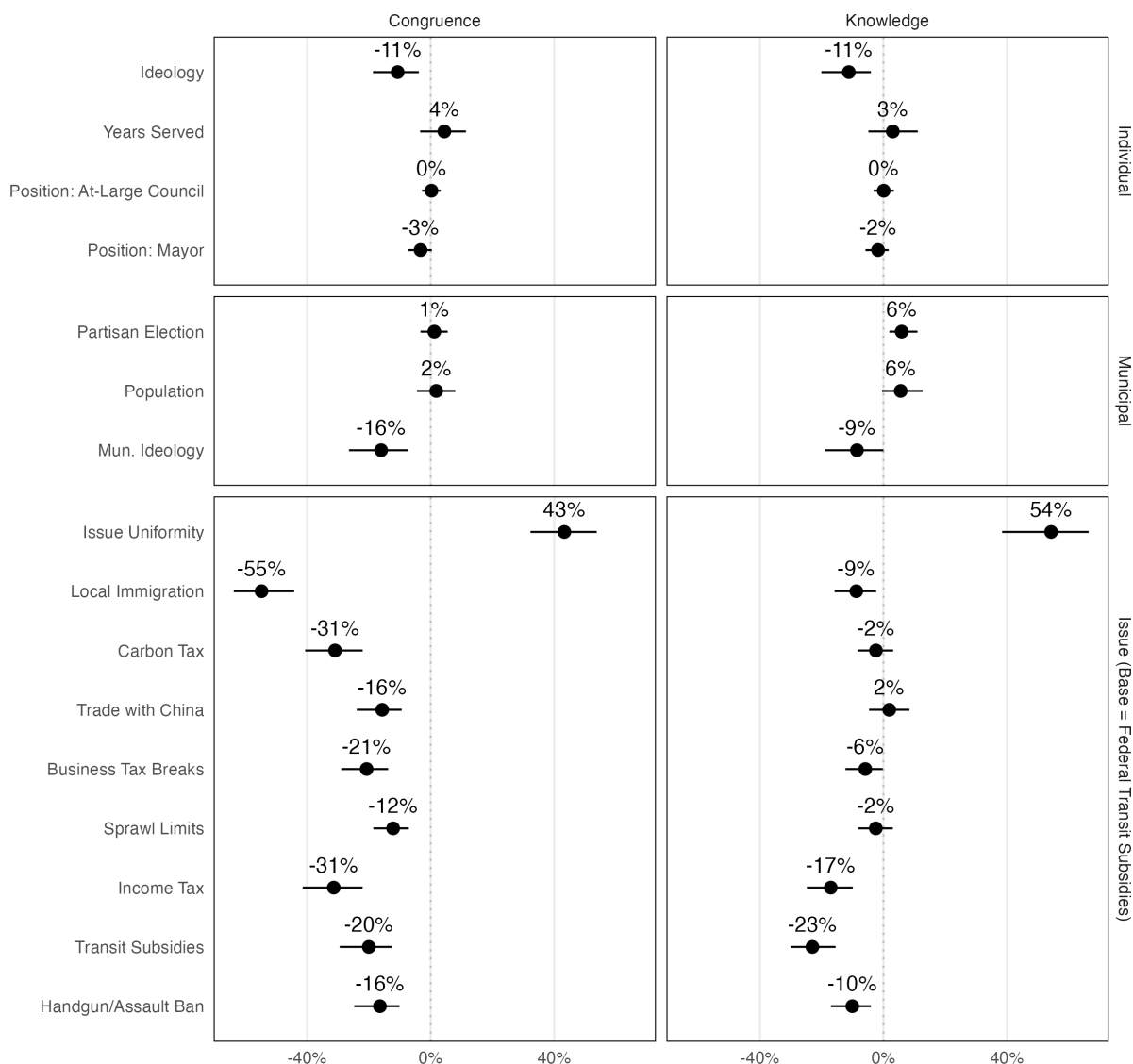


Figure 3: **Correlates of Congruence and Knowledge.** Marginal effects of each variable on the probability of successful congruence (left panel) or knowledge (right panel). Marginal effects drawn from Bayesian multilevel logit models; full tables available in the Supplementary Material.

generous staff support, and even, in the largest cities, occasional polling on high-profile municipal issues. Our findings support a growing consensus that, in contrast to expectations from an earlier body of scholarship (Oliver, 2012), population size is not strongly related to patterns of representation or responsiveness (Lucas and Armstrong II, 2021; Tausanovitch and Warshaw, 2014; Schaffner, Rhodes and La Raja, 2020).

In contrast to population size, the coefficient for municipal ideology is negative and substantively large in both models. This indicates that politicians in more conservative municipalities tend to perform more poorly on both knowledge and congruence. In other words, congruence and knowledge scores tend to be stronger among politicians in more progressive municipalities regardless of the politician's own ideological self-placement. This is an important (and, to our knowledge, heretofore unnoticed) correlate of politicians' representational performance, suggesting that both pathways are more challenging for politicians in very conservative municipalities. We provide additional information on this intriguing finding in the supplementary material (see Figure SM.2).

The other variable in the "municipal" category of the model, partisan elections, is also the only variable for which we see a substantial difference in the direction or magnitude of the coefficient across the two models. Politicians elected in partisan contests are no more or less likely than non-partisan politicians to be congruent with their constituents, but they are substantially more likely to correctly perceive municipal opinion. Perhaps, as we suggested above, partisan politicians have access to more information on their constituents' policy attitudes than their non-partisan counterparts. Or perhaps there is something else about partisan municipalities – increased competitiveness, more intensive media coverage, reduced incumbency advantage – that also makes politicians more aware of their constituents' attitudes. Whatever the source of the difference, the results in Figure 3 suggest that it is very much the exception to the rule: the correlates of congruence are otherwise very similar in direction, magnitude, and significance to the correlates of perceptual accuracy.

The bottom portion of both the congruence and knowledge models reinforce our finding in Figure 1 above: there are dramatic differences among issues in congruence and perceptual accuracy. The first variable in this section – by far the single largest predictor in the model – is the uniformity of issue opinion in the politician's district. When opinion is nearly unanimous, either in opposition or support, politicians are some 46 percentage points more likely to be congruent and 56 percentage points more likely to know constituency opinion than when

attitudes are evenly divided. Unsurprisingly, politicians represent public attitudes much more readily when those attitudes are clear. Even after we account for uniformity, however, Figure 3 reveals substantial differences in politicians’ performance across issues.¹⁰

To further evaluate these correlates, we fit a multinomial logit model using the four congruence-knowledge combinations described above. We summarize the results of this analysis in Figure 4. In the top panel, we provide an aggregate summary of the proportion of politicians who fall into each of the four “types”: those who perform well on both congruence and perceptual accuracy, those who perform poorly on both tasks, and those who perform well or poorly on one task, but not the other. For the purposes of this summary, we define “good” performance as successful congruence or knowledge for a majority the nine policy issues. In general, the figure suggests that politicians’ overall representational performance is strong: 58% of politicians perform well on *both* congruence and perceptual accuracy, and just 22% of politicians perform poorly in both categories. About a quarter of politicians reside in the “off-diagonal” categories, with 8% performing well in congruence, but poorly in perception, and just 11% performing well on perception, but poorly on congruence.

In the remaining panels of Figure 4, each coefficient summarizes the marginal effect of the variable on the probability that a municipal politician will belong to each congruence-knowledge type.¹¹ In keeping with the previous models, we find that membership in each of the four types is not strongly associated with most of the individual-level variables, such as tenure or seniority; however, the analysis does reinforce the finding that ideology is related to congruence and knowledge, with right-wing politicians less likely to belong to the “good congruence, good knowledge” type. Partisan elections also increase the likelihood of belonging to the good/good type.

¹⁰Comparing the marginal effect of the issues variable to each of the other variables in the model, we find that policy issues have a larger effect on the predicted probability of both congruence and perceptual accuracy the other variables, aside from uniformity ($p < 0.001$). Please see the supplementary material for more detail on this analysis.

¹¹This a multinomial logit model with varying intercepts by issue, municipality, and individual politician. We extracted predicted probabilities for each group from the model and used these probabilities to calculate the marginal effects and credible intervals. We implemented the model in Stan using the *brms* package in R with default priors; post-estimation inspection of R-hat values showed good evidence of convergence.

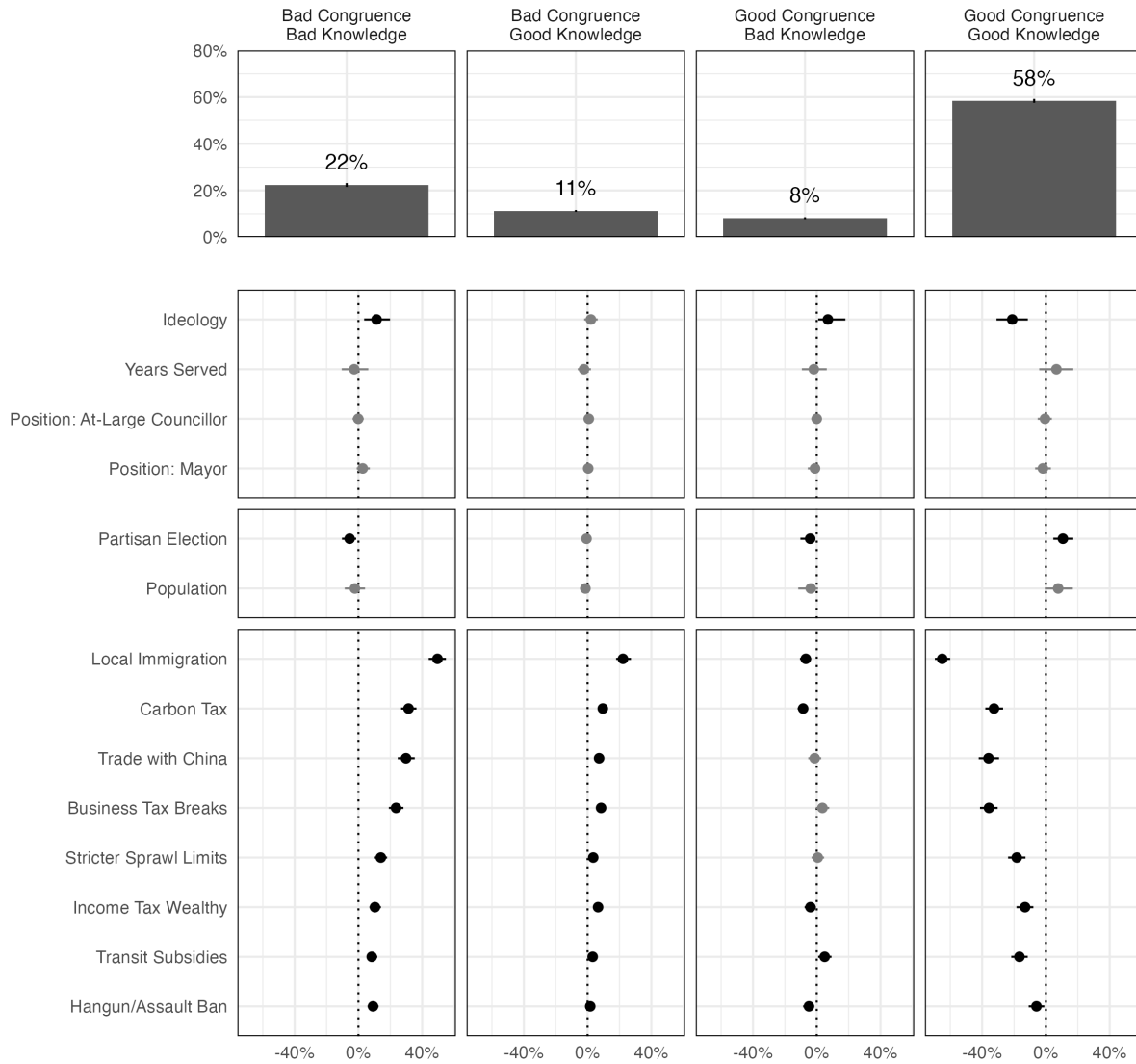


Figure 4: **Congruence-Knowledge Types and Marginal Effects.** Top panel reports proportion of politicians who fall into each congruence-knowledge type. Bottom panels report marginal effect of each variable on the probability of belonging to each congruence-knowledge type. Marginal effects drawn from Bayesian multilevel multinomial logit models; full table available in the Supplementary Material.

As before, however, it is the issue domain that most strongly conditions whether politicians do well on either representation pathway. Unsurprisingly, given the obvious variation across issues that was visible in Figure 1, the results in the multinomial logit model confirm that politicians' membership in the four congruence-knowledge categories varies dramatically

in probability as we move across the nine policy issues.

5 Discussion and Conclusion

Most empirical and normative theories of policy representation require that elected representatives accurately translate their constituents’ preferences into public policy outputs (Mansbridge, 2009; Soroka and Wlezien, 2009). Many studies, inspired by the “diamond model” proposed by Miller and Stokes (1963), assume that this is achieved either by having politicians whose positions are congruent with constituents *or* by having politicians who act on accurate knowledge of what their constituents want (Stimson, Mackuen and Erikson, 1995). Our findings in this paper suggest that the two pathways to representation are much more directly connected than this standard assumption would have us believe. Using data from hundreds of Canadian politicians and local public opinion estimates on nine policy issues, we find that politicians who perform well on congruence also tend to perform well on knowledge, with just a quarter of politicians performing well on one task but not the other. Moreover, the correlates of performance on the two pathways are extremely similar to one another: the characteristics that are associated with higher performance on one task are also, in nearly every case, significantly associated with higher performance on the other task as well. The two pathways are, in short, intimately connected to one another.

These findings have important implications for theoretical debates on representation. First, the fact that politicians’ performance on the two pathways tend to overlap so strongly suggests that strong theoretical distinctions between the two – such as congruence as “trustee” or “selection” representation, and knowledge as “delegate” or “sanction” representation (Erikson, Luttbeg and Holloway, 1975; Mansbridge, 2009) – do not capture how policy representation plays out in practice. Provided that our findings replicate at other levels of government and in other countries – an important next step for this research – they suggest that the congruence/knowledge distinction does not map cleanly on to delegate/trustee role theory

or sanction/selection models of representation. Instead, we need to develop theories of how both congruence *and* knowledge might be expected to function under sanction and selection models while also exploring the casual relationship between congruence and knowledge in empirical work. One possibility, for instance, is that citizens tend to select politicians who share their policy preferences, and those politicians build a mental picture of their constituents’ preferences primarily by projecting their own views onto their constituents, a “congruence-first” causal sequence that more directly resembles selection models of representation. Alternatively, vote-seeking politicians may be motivated to develop accurate knowledge of their constituents’ preferences, and by virtue of seeking out this knowledge and articulating it in policy debates, they may come to share their constituents’ views even in areas in which they did not originally agree; this “knowledge-first” causal sequence aligns more directly with sanction or vote-seeking models of representation. Our analysis suggests that there is considerable value in thinking about congruence and knowledge not as competing or contrasting pathways to representation, but rather as interrelated parts of a complex causal sequence.

Second, our findings clearly demonstrate the role of issue domain for understanding politicians’ performance on both the congruence and knowledge pathways. While this issue-based variation has turned up consistently in research on congruence and knowledge, it is strikingly under-theorized. Existing accounts point to the importance of issue ownership for perceptual accuracy (Varone and Helfer, 2021) and note that politicians are more congruent with the public on issues where their reference groups (e.g. high status individuals) are aligned with majority opinion (Pereira (2021), see also Hertel-Fernandez, Mildemberger and Stokes (2019)). Yet explanations rooted in the concrete policy domains under consideration are generally lacking. We need to begin to theorize why some issues are more difficult for politicians than others, the conditions in which uniformity of public opinion improves congruence and accuracy, and perhaps even to attempt to typologize issue domains on the basis of the representational successes or failures they tend to provoke. For instance, our

study suggests that immigration policy is an area of particular difficulty for contemporary politicians in our Canadian sample, but this policy domain may not be unique – perhaps there are other issue areas that cause similar difficulties, either because of their substance or because of peculiarities of the distribution of public opinion on those issues. Developing more robust theories of "easy" or "challenging" issue types, and testing these theories across a variety of issue questions and comparative contexts – including meta-analyses of past perceptual accuracy studies – is an important priority for researchers who are interested in politicians' performance as policy representatives.

Third, we have found few strong individual or institutional predictors of congruence and knowledge. These findings reinforce a curious yet consistent body of evidence about the relative unimportance of institutional and contextual differences – district type, population size, and so on – for representational success among local politicians (Lucas and Armstrong II, 2021; Tausanovitch and Warshaw, 2014). However, the literature suggests other individual-level sources of variance in representational types and capabilities – e.g. domain expertise and issue ownership, (Varone and Helfer, 2021), a predisposition towards certain reasoning biases (Hertel-Fernandez, Mildemberger and Stokes, 2019), or the innate disposition towards projection of one's own opinion on others (Belchior, 2014; Esaiasson, Holmberg and Westerlund, 2017) – and further investigation of these mechanisms will help to clarify both the sources of improved performance and their consequences for policy representation and career success.

While the institutional and contextual factors we explored here appear to play a secondary role in explaining congruence and knowledge, our results underscore the need to explore the impact of additional institutional/contextual factors that require a comparative design to assess. Extensions of our work to politicians at other levels of government and in other countries will help to clarify the circumstances in which politicians' representational performance is easier or more difficult. Of particular importance is our finding that politicians in more right-leaning communities struggle more with congruence and knowledge than

politicians in more left-leaning communities. Future research should seek to replicate this finding in other contexts and to attempt to understand what it is about more conservative places – such as attitudinal heterogeneity, anti-government sentiment, more extreme policy positions, or other factors – that makes congruence and knowledge particularly challenging in those contexts.

Most generally, we have found that politicians in our sample perform well on both congruence and knowledge. But it is not yet clear where this pattern might be expected to occur. Certain institutional environments, such as ideologically or socially homogenous constituencies, might make it easier for politicians to infer their constituents' positions; on the other hand, our results are no different in small and more homogenous municipalities vs. large and heterogeneous global cities, suggesting that homogeneity may not be a critical ingredient for representational success. Similarly, being elected through party lists could make it easier for politicians who are less congruent with a broader constituency to gain office and exhibit divergent congruence/knowledge performance. Identifying and synthesizing the potential impact of these institutional differences on both congruence and knowledge could therefore produce testable predictions on where we should expect to see the two pathways for representation operating together or as complements.

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Supplementary Material for “Pathways to Substantive
Representation: Policy Congruence and Policy
Knowledge among Canadian Local Politicians”

October 17, 2024

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1 Survey Questions

Table SM.1 summarizes the issue questions we asked in both the public opinion and politician surveys. Response options for each question were “Support”, “Oppose”, and “Don’t Know”. On the survey of municipal politicians, we also asked the following question before asking for politicians’ own views: “We would like to know a little about the views of residents in your municipality on each of the following ideas or proposals. For each item, please tell us the percentage of residents in your municipality who would SUPPORT the idea or proposal.”

Table SM.1: Overview of Survey Questions: Public Opinion Survey

| Question | Responses | Proportion Agree |
|---|-----------|------------------|
| Do you think the federal government should: | | |
| Ban handguns and assault weapons | 10339 | 0.76 |
| Continue with the carbon tax | 10339 | 0.41 |
| Increase funding for public transit infrastructure | 10339 | 0.68 |
| Raise income taxes on people earning more than \$200,000 | 10339 | 0.74 |
| Increase trade with China | 10339 | 0.40 |
| Do you think your municipal government should: | | |
| Encourage more immigrants to settle in your municipality | 10339 | 0.34 |
| Give tax breaks to businesses that move to the municipality | 10339 | 0.48 |
| Subsidize public transit for low-income people | 10339 | 0.73 |
| Create stricter rules to limit urban sprawl | 10339 | 0.49 |

2 Models: Full Table and Detail

To provide additional context for our results in the main text, we summarise the bivariate association for each predictor variable and congruence/knowledge in figure 2.

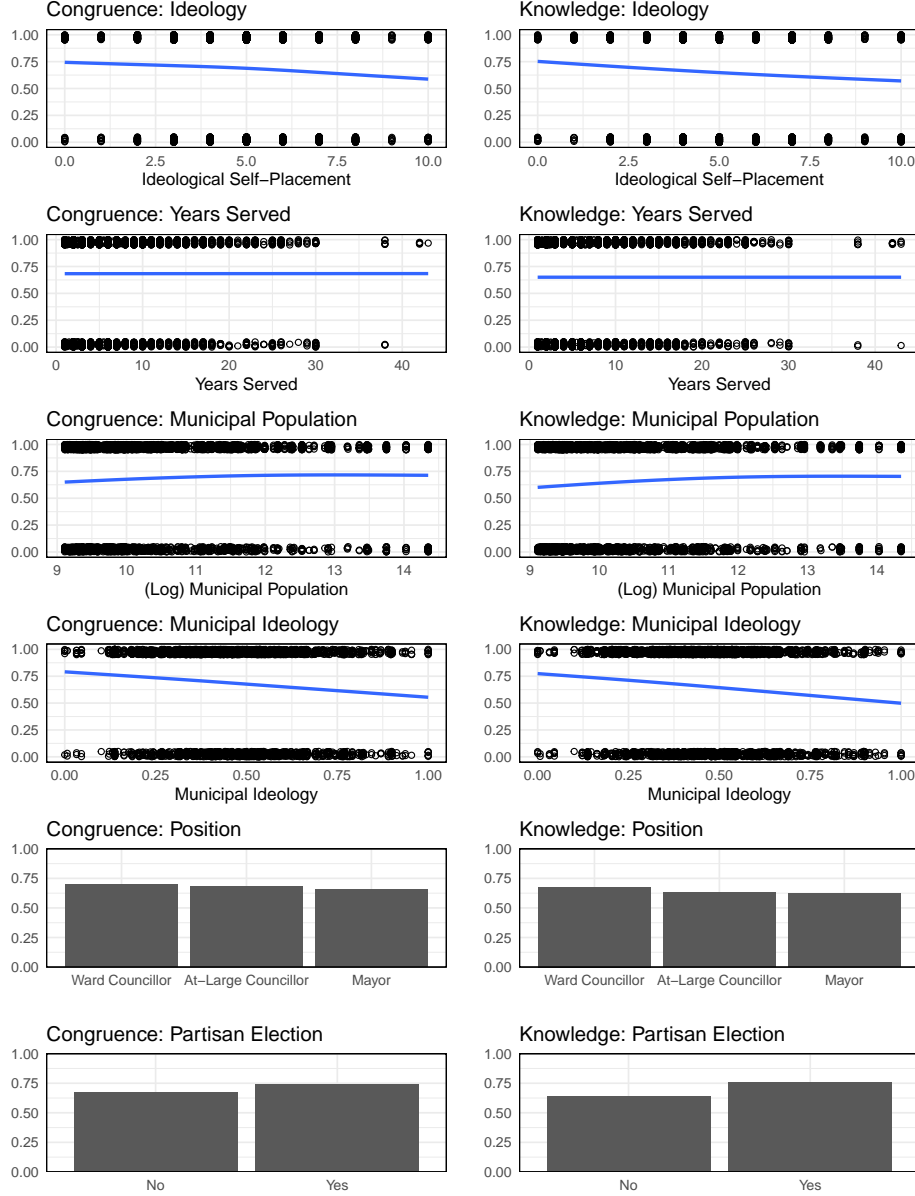


Figure SM.1: Bivariate relationships for each main predictor variable in main text model.

We model congruence and perceptual accuracy as a function of individual predictors and municipal predictors, while allowing intercepts for individual respondents, municipalities, and issues to vary:

$$\log \frac{p(\text{congruent}_i)}{1 - p(\text{congruent}_i)} = \theta_0 + \beta_1 \text{years}_i + \beta_2 \text{position}_i + \beta_3 \text{ideology}_i + \alpha_{k[i]}^{\text{mun}} + \alpha_{m[i]}^{\text{ind}} + \alpha_{n[i]}^{\text{issue}}$$

In both cases, we model individual and issue intercepts as drawn from a normal distribution with mean zero:

Table SM.2: Results Table: Congruence and Perceptual Accuracy

| Variable | Congruence | | | | | Knowledge | | | | |
|----------------------------|------------|------|----------|----------|------|-----------|------|----------|----------|------|
| | Median | SD | Lower CI | Upper CI | 1-Pr | Median | SD | Lower CI | Upper CI | 1-Pr |
| Individual | | | | | | | | | | |
| Years Served | 0.26 | 0.23 | -0.18 | 0.70 | 0.14 | 0.16 | 0.22 | -0.28 | 0.61 | 0.23 |
| Position: At-Large Council | 0.01 | 0.09 | -0.16 | 0.17 | 0.46 | 0.00 | 0.09 | -0.16 | 0.18 | 0.48 |
| Position: Mayor | -0.16 | 0.10 | -0.35 | 0.04 | 0.05 | -0.08 | 0.10 | -0.27 | 0.11 | 0.20 |
| Ideology | -0.77 | 0.20 | -1.16 | -0.39 | 0.00 | -0.69 | 0.19 | -1.05 | -0.33 | 0.00 |
| Municipal | | | | | | | | | | |
| Partisan Election | 0.19 | 0.12 | -0.04 | 0.43 | 0.06 | 0.41 | 0.12 | 0.17 | 0.64 | 0.00 |
| Population | 0.32 | 0.17 | 0.00 | 0.64 | 0.02 | 0.43 | 0.17 | 0.10 | 0.78 | 0.00 |
| Issues | | | | | | | | | | |
| Issue Uniformity | 2.92 | 0.24 | 2.43 | 3.40 | 0.00 | 3.51 | 0.24 | 3.04 | 4.01 | 0.00 |
| Trade with China | 0.30 | 0.33 | -0.34 | 0.96 | 0.17 | 0.47 | 0.20 | 0.10 | 0.90 | 0.01 |
| Carbon Tax | -0.44 | 0.32 | -1.06 | 0.20 | 0.08 | 0.24 | 0.18 | -0.11 | 0.62 | 0.08 |
| Hangun/Assault Ban | 0.18 | 0.34 | -0.46 | 0.85 | 0.27 | -0.14 | 0.19 | -0.53 | 0.22 | 0.22 |
| Local Immigration | -1.41 | 0.33 | -2.04 | -0.76 | 0.00 | -0.06 | 0.19 | -0.41 | 0.34 | 0.37 |
| Income Tax | -0.51 | 0.33 | -1.15 | 0.13 | 0.06 | -0.43 | 0.20 | -0.85 | -0.06 | 0.01 |
| Transit Subs | 0.00 | 0.33 | -0.64 | 0.66 | 0.49 | -0.66 | 0.20 | -1.08 | -0.31 | 0.00 |
| Business Tax | 0.03 | 0.32 | -0.60 | 0.66 | 0.46 | 0.07 | 0.18 | -0.29 | 0.46 | 0.33 |
| Federal Transit | 1.54 | 0.35 | 0.91 | 2.29 | 0.00 | 0.34 | 0.19 | -0.03 | 0.72 | 0.03 |
| Urban Sprawl | 0.49 | 0.33 | -0.13 | 1.15 | 0.06 | 0.23 | 0.18 | -0.11 | 0.61 | 0.09 |

$$\alpha_m^{ind} \sim \mathcal{N}(0, \sigma_{ind}^2)$$

$$\alpha_n^{issue} \sim \mathcal{N}(0, \sigma_{issue}^2)$$

We model municipal intercepts as predicted by two municipal variables: logged population density and partisan elections:

$$\alpha_k^{mun} \sim \mathcal{N}(\mu_k^{mun}, \sigma_k^2)$$

$$\mu_k^{mun} \sim \gamma_0 + \gamma_1 density_k + \gamma_2 partisan_k$$

Both are Bayesian multilevel logit models, estimated using rstanarm with default priors. We draw 2,000 samples from each of four chains following a warm-up period of 2,000 iterations. Post-estimation tests provide strong evidence of model convergence; R-hat values are 1.0 for all parameters, and traceplots show clear evidence of mixing. Traceplots and \hat{R} values show good evidence of convergence.

In the table below, we provide the results of both models summarised in the coefficient plot in the main text.

To test the robustness of these results, we fit alternative models for both knowledge and congruence using continuous rather than dichotomous measures. For congruence, we calculate a continuous agreement measure as the proportion of municipal residents who agree with the politician’s stated position. For knowledge, we calculate the absolute error of the politician’s estimate and subtract this amount from one, such that, for both measures, higher values are equivalent to better performance. While both measures theoretically range from zero to one, our continuous knowledge measure contains less variance than the continuous congruence measure, and for this reason, the coefficients are less directly comparable than those for our dichotomous measure (this is one reason we prefer the dichotomous measure in the main text). We report the results of these models in columns 2 and 5 in table SM.3 (labelled “cont”). While the coefficients are not directly comparable to the main text models (models 1 and 4), the table confirms

that the direction and statistical significance of the relationships are consistent regardless of our choice of a dichotomous or continuous measure. Table SM.3 also includes a final model (columns 3 and 6) in which we replace politician’s ideological self-placement with their federal party identification.

To assess the relative importance of the issues variable and the other variables in the models, we simply calculate the marginal effects of each variable on the probability of congruence or perceptual accuracy (comparing the maximum to the minimum value in each case, holding other variables at their medians), draw 1,000 of these marginal effects from the model’s posterior distribution, and compare the marginal effects. This enables an assessment of the probability that the marginal effect of one variable (policy issues) is larger than other issues. Comparing issues to the other variables in the model, we find that the marginal effect of issues is larger than the marginal effect of the other variables; the probability that this is *not* the case is less than 1/1000 ($pr < 0.001$).

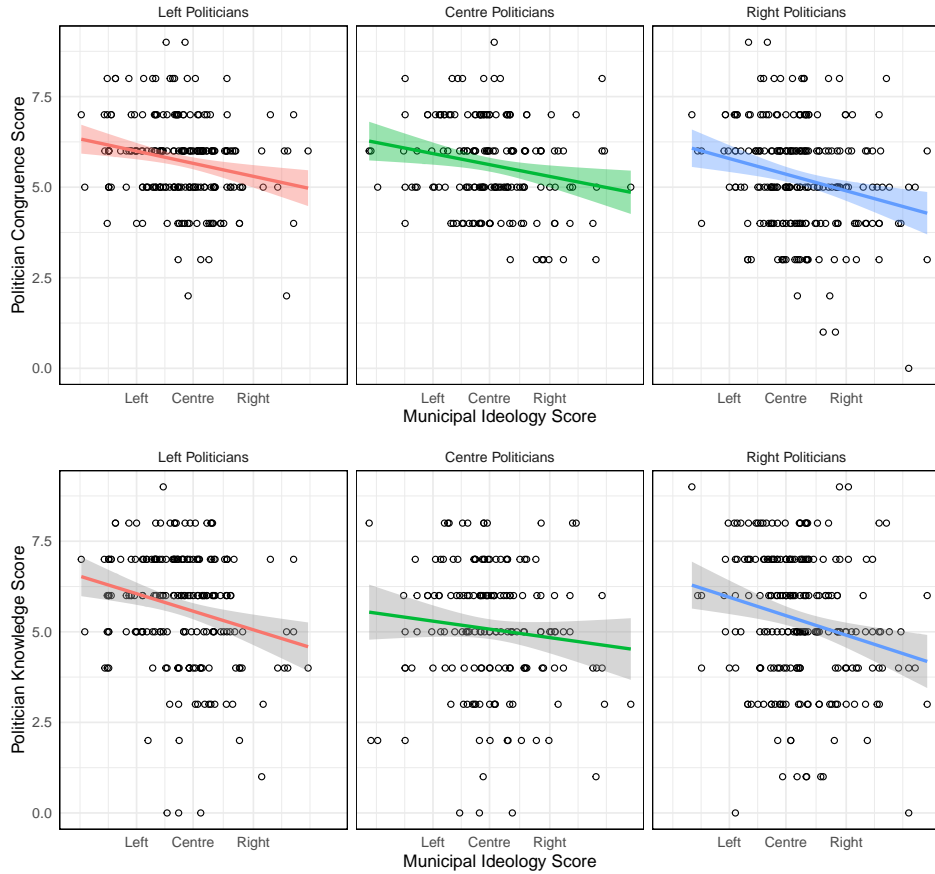


Figure SM.2: Congruence and Knowledge by Municipal Ideology and Politician’s Ideological Self-Placement

To more fully understand the ideology results in our model, we carried out an additional analysis, summarized in figure 2 below. The vertical axis describes politicians’ congruence scores (top row) and knowledge scores (bottom row). The horizontal axis captures municipal policy ideology scores drawn from Lucas and Armstrong II (2021). We plot the relationship between municipal ideology and performance among politicians who place themselves on the left (the red coefficients in the left column), in the centre (the green coefficients in the centre column) and on the right (the blue coefficients in the right

Table SM.3: Robustness Test: Alternative Models

| | Congruence | | | Knowledge | | |
|--------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | Main | Cont. | Part. | Main | Cont. | Part. |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Years in Office | 0.006 (0.005) | 0.0003 (0.0004) | 0.005 (0.005) | 0.004 (0.005) | 0.001 (0.0005) | 0.003 (0.005) |
| Position: At-Large | 0.011 (0.087) | -0.003 (0.006) | 0.031 (0.080) | 0.002 (0.084) | 0.005 (0.008) | -0.064 (0.081) |
| Position: Mayor | -0.159 (0.099) | -0.017** (0.007) | -0.172* (0.093) | -0.084 (0.096) | 0.001 (0.009) | -0.169* (0.094) |
| Ideology | -0.077*** (0.019) | -0.012*** (0.001) | | -0.069*** (0.018) | -0.012*** (0.002) | |
| PID: Liberal | | | 0.156* (0.090) | | | 0.066 (0.088) |
| PID: Conservative | | | -0.190** (0.089) | | | -0.040 (0.091) |
| PID: NDP | | | 0.058 (0.144) | | | 0.250* (0.145) |
| PID: Green | | | 0.155 (0.175) | | | 0.449** (0.181) |
| PID: Bloc | | | 0.356* (0.205) | | | 0.325 (0.207) |
| PID: Other | | | -0.255 (0.540) | | | 0.379 (0.584) |
| Partisan Election | 0.191 (0.119) | 0.016* (0.009) | 0.163 (0.110) | 0.407*** (0.117) | 0.030*** (0.010) | 0.377*** (0.115) |
| Population | 0.062* (0.032) | 0.003 (0.002) | 0.080*** (0.029) | 0.081** (0.032) | 0.012*** (0.003) | 0.098*** (0.031) |
| Issue Uniformity | 2.913*** (0.252) | 0.372*** (0.018) | 2.721*** (0.236) | 3.456*** (0.247) | 0.102*** (0.017) | 3.494*** (0.237) |
| Constant | -0.589 (0.466) | 0.480*** (0.033) | -1.099*** (0.425) | -1.336*** (0.401) | 0.661*** (0.038) | -1.879*** (0.376) |
| Observations | 5,116 | 5,116 | 5,827 | 5,213 | 5,213 | 5,900 |

Note:

*p<0.1; **p<0.05; ***p<0.01

column). In each case, the relationship between municipal ideology and performance is negative, indicating that congruence and knowledge scores are lower, on average, in more conservative municipalities. Because right-wing politicians are more likely to be elected in right-wing municipalities, a substantial portion of the performance difference between left-wing and right-wing politicians may originate in this underlying difference between left-leaning and right-leaning municipalities.

3 Multinomial Logit Analysis

Table SM.4 provides the results of a multinomial logit model exploring the predictors of belonging to the four congruence/knowledge classes we identify in the main text.

Table SM.4: Multinomial Logit: Congruence and Knowledge Types

| Variable | Congruence (0), Knowledge (1) | | | | Congruence (1), Knowledge (0) | | | | Congruence (1), Knowledge (1) | | | |
|------------------------|-------------------------------|------|-------|-------|-------------------------------|------|-------|-------|-------------------------------|------|-------|-------|
| | Median | SD | Lower | Upper | Median | SD | Lower | Upper | Median | SD | Lower | Upper |
| Individual | | | | | | | | | | | | |
| Years Served | -0.24 | 0.42 | -1.09 | 0.52 | -0.08 | 0.44 | -0.93 | 0.80 | 0.23 | 0.28 | -0.31 | 0.79 |
| Position: At-Large | 0.05 | 0.15 | -0.26 | 0.36 | -0.01 | 0.17 | -0.34 | 0.33 | -0.01 | 0.11 | -0.22 | 0.22 |
| Position: Mayor | -0.13 | 0.18 | -0.49 | 0.22 | -0.26 | 0.20 | -0.66 | 0.14 | -0.15 | 0.12 | -0.39 | 0.10 |
| Ideology | -0.12 | 0.35 | -0.81 | 0.57 | 0.03 | 0.39 | -0.71 | 0.80 | -0.98 | 0.24 | -1.45 | -0.51 |
| Municipal | | | | | | | | | | | | |
| Partisan Election | 0.26 | 0.20 | -0.11 | 0.64 | -0.26 | 0.24 | -0.72 | 0.20 | 0.41 | 0.15 | 0.11 | 0.71 |
| Municipal Population | -0.28 | 0.28 | -0.84 | 0.28 | -0.28 | 0.31 | -0.90 | 0.32 | 0.18 | 0.22 | -0.24 | 0.63 |
| Issues | | | | | | | | | | | | |
| Trade with China | -0.27 | 0.24 | -0.77 | 0.16 | -0.46 | 0.49 | -1.45 | 0.45 | -0.78 | 0.50 | -1.77 | 0.24 |
| Carbon Tax | 0.04 | 0.22 | -0.38 | 0.48 | -1.51 | 0.50 | -2.59 | -0.56 | -0.52 | 0.50 | -1.51 | 0.47 |
| Gun Control | -0.42 | 0.29 | -1.05 | 0.06 | 0.03 | 0.49 | -0.95 | 1.00 | 0.78 | 0.50 | -0.19 | 1.79 |
| Local Immigration | 0.29 | 0.20 | -0.08 | 0.71 | -1.84 | 0.50 | -2.85 | -0.92 | -2.32 | 0.51 | -3.31 | -1.31 |
| Income Tax | 0.57 | 0.26 | 0.11 | 1.12 | 0.15 | 0.49 | -0.85 | 1.08 | 0.61 | 0.51 | -0.40 | 1.68 |
| Transit Subsidies | 0.10 | 0.25 | -0.40 | 0.61 | 1.04 | 0.48 | 0.07 | 1.97 | 0.67 | 0.51 | -0.30 | 1.70 |
| Business Tax Breaks | 0.12 | 0.22 | -0.31 | 0.58 | 0.23 | 0.47 | -0.75 | 1.18 | -0.40 | 0.50 | -1.39 | 0.60 |
| Federal Transit Funds | -0.25 | 0.34 | -1.02 | 0.31 | 1.74 | 0.50 | 0.75 | 2.72 | 1.98 | 0.52 | 0.97 | 3.05 |
| Stricter Sprawl Limits | -0.19 | 0.26 | -0.74 | 0.27 | 0.38 | 0.48 | -0.61 | 1.31 | 0.33 | 0.51 | -0.65 | 1.37 |

4 MRP Estimates: Additional Detail

Table SM.5: Predictor Variables in MRP Models

| Dependent Variable | Predictor Variables (from BMA) |
|----------------------|--|
| Hangun ban | Municipal ideology, housing (owner), language (French), log(density) |
| Carbon tax | Municipal ideology, housing (owner), married |
| Transit funding | Municipal ideology, employment rate, pre-1960 housing stock |
| Income taxes | Income (top decile), NOC 4 (Education, Law, Government), housing (owner), municipal ideology, commute by transit, commute by car |
| Trade with China | Proportion Christian, median income, employment rate, median age, married, NOC 7 (trades) |
| Immigrant settlement | Municipal ideology, Conservative vote share, proportion Christian, university education, language (English), immigrants |
| Local tax breaks | Immigrants, proportion white, dwellings (single detached) |
| Transit subsidies | Language (French), housing (owner), commute by car, proportion Christian, proportion white |
| Urban sprawl | (Log) density, median age, NOC 4 (education, law, government), municipal ideology |

To estimate public opinion on each issue in each municipality, we begin with the following model of issue support:

$$\log \frac{p(\text{agree}_i)}{1 - p(\text{agree}_i)} = \theta_0 + \alpha_j^{\text{age.sex.edu}} + \alpha_{k[i]}^{\text{mun}} + \alpha_{l[i]}^{\text{region}}$$

We model age, gender, and education intercepts as drawn from a normal distribution with mean zero:

$$\alpha_j^{\text{age.sex.edu}} \sim \mathcal{N}(0, \sigma_{\text{age.sex.edu}}^2)$$

We model municipal intercepts as predicted by regional intercepts as well as a set of k municipality-level predictors γ_k . To select these predictors, we began by collecting an estimate of Conservative Party votes share by municipality (taken from Lucas (2022)) and a measure of municipal policy conservatism by municipality (taken from Lucas and Armstrong II (2021)), along with a set of twenty-six socio-economic characteristics of each municipality drawn from the Canadian census (these characteristics capture population size, density, income, education levels, housing stock, proportion of immigrants, occupational characteristics, commuting modes, language, and racial diversity). We used Bayesian model averaging (BMA) to select predictors for each model, choosing between three and six predictors per model.¹ We confirmed the results of this test using lasso regularization, which suggested a similar set of variables for each model.

¹More specifically, we selected all variables with more than a 20% posterior probability of inclusion, with the stipulation that each model would include a minimum of three predictors.

$$\begin{aligned}\alpha_k^{mun} &\sim \mathcal{N}(\mu_k^{mun}, \sigma_k^2) \\ \mu_k^{mun} &\sim \alpha_{l[i]}^{region} + \gamma_{k1} \dots \gamma_{kn}\end{aligned}\tag{1}$$

We describe the variables suggested by this procedure in table SM.5. As expected, different policy attitude variables benefit from different sets of predictor variables. This procedure allows us to generate municipal opinion estimates that are more accurate and precise than would be the case with a fixed set of predictors for all models.

Finally, we assume that region intercepts (BC, Prairies, Ontario, Quebec, Atlantic Canada) are drawn from a normal distribution with mean zero:

$$\alpha_l^{region} \sim \mathcal{N}(0, \sigma_{region}^2)$$

We assume diffuse default priors for all γ parameters in study 2, and diffuse normal priors of $\mathcal{N}(0, 2.5)$ for all γ parameters in study 3. We use stan, as implemented in the rstanarm package in R, to generate estimates, drawing 2,000 samples from each of four chains following a warm-up period of 2,000 iterations. Post-estimation tests provide strong evidence of model convergence; \hat{R} values are 1.0 for all parameters, and traceplots show clear evidence of mixing.

4.1 MRP Estimates and Local Weights

To further validate our MRP estimates, we compare the MRP estimates to weighted local estimates for 237 municipality-issue pairs in which available data allows us to construct weighted estimates using respondents' age, sex, and education level using nothing but local data. These are, of course, only a subset of the full data; in addition to its several other advantages, the MRP estimate allows us to incorporate estimates from many more issues in many more municipalities than the simple local weighted means. When both *are* available, however, the two estimates are strongly correlated ($r=0.96$), providing further reassurance that the MRP estimates are performing well.

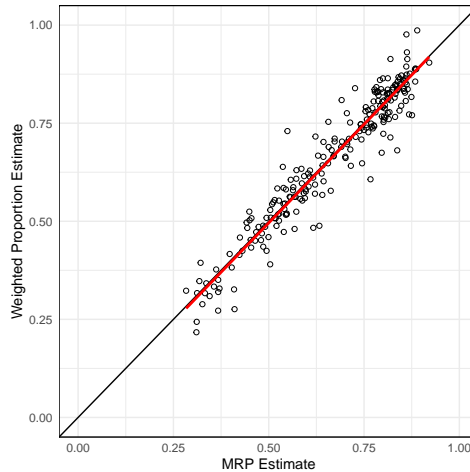


Figure SM.3: Comparison: MRP Estimates and Local Weighted Estimates

5 MRP Estimates: Propagating Uncertainty

A major advantage of fully Bayesian multilevel regression and poststratification models is that they enable researchers to inspect the *uncertainty* of local public opinion estimates, and to incorporate this uncertainty in subsequent analysis. To explain how we do this in our paper, and to provide more detail on why this is valuable, we begin with a single example: public opinion on the issue of property tax incentives for business in the Town of Conception Bay in Newfoundland (population 26,000). Our MRP estimate is that a strong majority of Conception Bay residents (67%) favour this policy proposal. When we inspect the posterior distribution of this estimate across the 4,000 posterior draws, we find the following distribution:

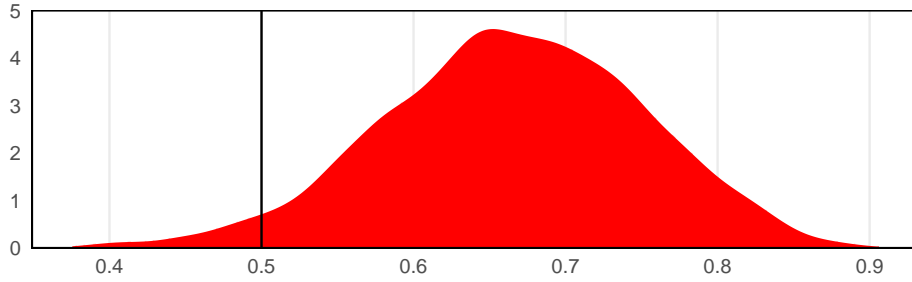


Figure SM.4: Illustrative Example: Distribution of MRP Estimates for Property Tax Issue in Conception Bay, Newfoundland

Given this distribution, we can be quite confident that a majority of Conception Bay residents favour the policy. But it is also clear that a small portion of the probability distribution (3.2%) is on the left side of 50%. Thus, if a politician in Conception Bay had said that less than 50% of residents opposed the policy, it is *possible*, given these data, that the politician is correct. Similarly, if the politician had said that he or she opposes the policy, it is *possible* that they are in fact congruent with their constituents. Put simply, we should not pretend that our MRP estimates in each municipality are estimated without error. We should instead propagate our own uncertainty in the estimates through the scores that we give municipal councillors for their responses.

In the case of our analysis in this paper, incorporating this underlying uncertainty is relatively simple. The Bayesian multilevel regression model provides 4,000 posterior draws for the parameters in the model. We can use these to calculate 4,000 MRP estimates of public opinion in each municipality for each issue. These provide a distribution of 4,000 plausible values for public opinion in each municipality for each issue – 4,000 distributions like the one for Conception Bay that we visualize above. We can then calculate congruence and knowledge scores for each politician for each of these draws. In the case of the property tax issue in Conception Bay, for example, this will mean that politicians who guessed that a majority supports the issue in their district will be recorded as “correct knowledge” for most but not all draws. By summarizing these congruence and knowledge scores for each posterior draw, and then describing the 2.5%, 50%, and 97.5% percentiles of those summaries, we can express, for example, the overall probability that politicians are congruent on the property tax issue as well as the 95% credible intervals for that probability estimate.

As is clear in the main text, these credible intervals are generally small, which reflects the fact that we are estimating public opinion in relatively large communities using a very

large ($N > 10,000$) sample, and also that our municipal-level predictors in the multilevel model perform well.

6 Congruence and Knowledge Relationship: Continuous Measures

In the figure below, we replicate the figure from the main text using politicians' performance on the continuous knowledge and congruence measures, rather than the dichotomous measures. The results reinforce the findings in the main text. See table SM.3 above and associated text for more detail on the calculation of the continuous measures.

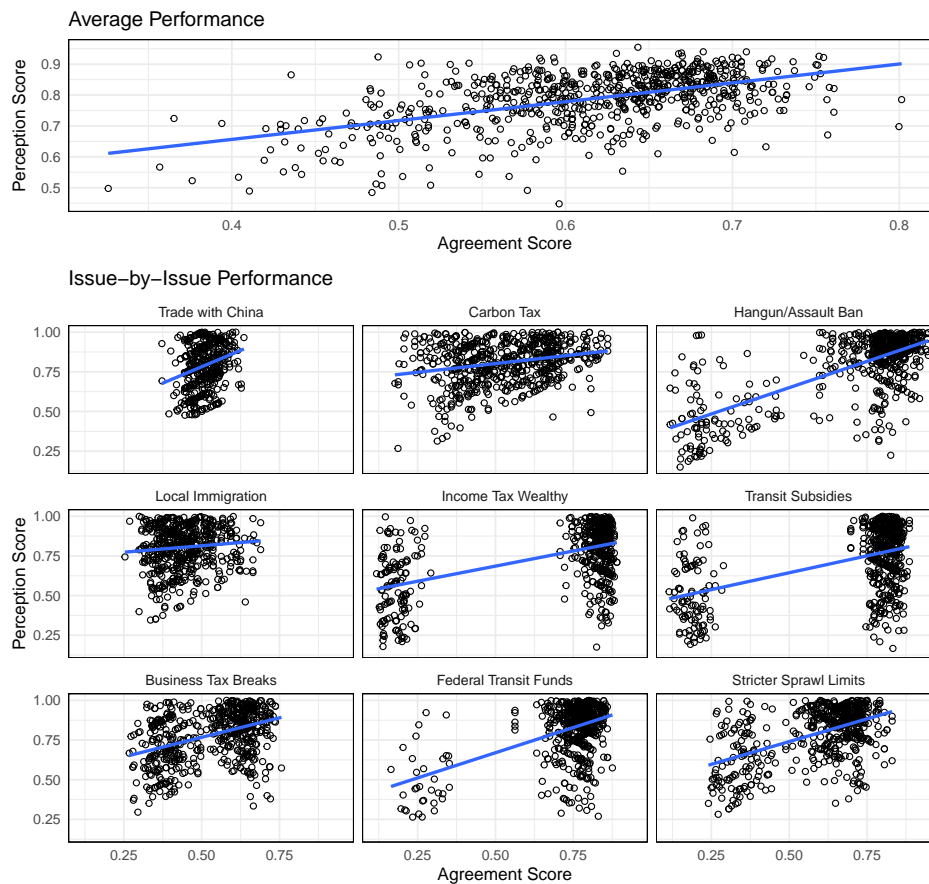


Figure SM.5: Relationship between Congruence and Knowledge, Continuous Measures

7 Ward and At-Large Politicians

Figure 7 and Table SM.6 replicate the main results from the main text when ward councillors are removed. The results demonstrate that the substantive findings do not depend on the inclusion of ward councillors in the analysis.

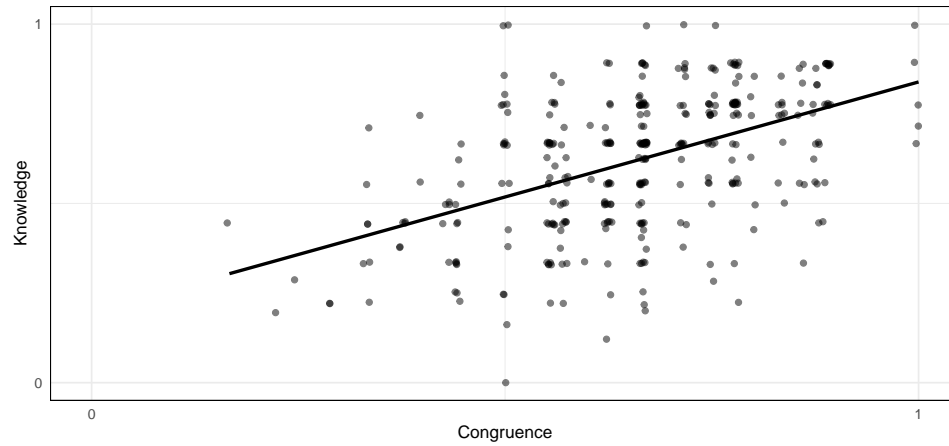


Figure SM.6: Relationship between Congruence and Knowledge, No Ward Councillors

Table SM.6: Robustness Test: Excluding Ward Councillors

| | Congruence | Perception |
|-------------------|-----------------------------|----------------------|
| | (1) | (2) |
| Years in Office | 0.537* (0.318) | 0.215 (0.314) |
| Ideology | -1.083*** (0.267) | -0.768*** (0.267) |
| Position: Mayor | -0.172 (0.106) | -0.072 (0.106) |
| Partisan Election | 0.020 (0.196) | 0.159 (0.197) |
| Population | 0.404 (0.285) | 0.539* (0.289) |
| Issue Uniformity | 2.616*** (0.340) | 3.245*** (0.343) |
| Constant | 0.216 (0.322) | -0.476* (0.244) |
| Observations | 2,544 | 2,608 |
| <i>Note:</i> | *p<0.1; **p<0.05; ***p<0.01 | |

References

Lucas, Jack. 2022. “Do ‘Non-Partisan’ Politicians Match the Partisanship of their Constituents?” *Urban Affairs Review* 58(1):103–128.

Lucas, Jack and David A. Armstrong II. 2021. “Policy Ideology and Local Ideological Representation in Canada.” *Canadian Journal of Political Science* 54(4):959–976.