

# The Vote Compass Algorithm

Ontario Provincial Election 2011

## 1 Introduction

The Vote Compass results section is comprised of multiple elements. The first and most prominent element is the two-dimensional graph, which serves as an abstract representation of the Ontarian political landscape. This graph consists of two ideological dimensions—social and economic—and is represented by a social liberalism-conservatism axis and an economic left-right axis. The second element is an issue position bar graph, which displays a user’s level of agreement with each party across the 30 key Vote Compass questions. Unlike the two-dimensional graph, the bar graph represents the average distance of a user to each party on the issues. These are two different measures of two different concepts.

The consequence of including multiple measures is that there will sometimes be disagreement between the party that appears “closest” on the two-dimensional graph and that which appears “closest” on the bar graph. One reason for this is because these graphs are representations of different concepts. It is also because there is no perfect measure of political position, either ideologically or on individual issues. In a public tool of this nature, it is necessary to recognize the trade-off between increased methodological sophistication and the ease with which a method can be understood by the public. The use of multiple measures admits as much. It is a nod to the reality that the political world—both among politicians and the public—is complex. It is this complexity that makes politics so lively and contentious, and why successful policies and politics often require great imagination from the public and their political representatives. The purpose of this tool is thus to engage Canadians in thinking through this complexity; to encourage Vote Compass users to learn where parties stand on the issues and the reasons for which they do so; and to raise the level and quality of political information among Canadians more generally. It is for this reason that we encourage all users to go beyond the results section by clicking on each party on the two-dimensional or bar graph to see where the parties stand on the issues, and to read the documentation that supports the “coding” of these positions.

## 2 Two-dimensional Graph

The components used to determine a user’s position on the two-dimensional graph are 1) a user’s responses to the 30 Vote Compass attitudinal and policy-related questions, and 2) a user’s responses concerning the importance of each issue. The questions on issue importance can be found by selecting “Enhance your Results” in the results section.

Each question on the issues is defined both by whether it is a ‘social’ or ‘economic’ question and by the side of the ideological spectrum that responses to a question are on. For example, a response of “strongly agree” to one question may indicate a more “conservative” attitude while the response of “strongly agree” to another question might indicate a more “liberal” attitude. This means that responding “strongly agree” for all questions will result in a mixture of strongly conservative and strongly liberal answers.

### User and Party Position (“Unweighted”)

Once a user has answered the 30 Vote Compass questions, his or her position in the political landscape is calculated by averaging the questions  $x$  on dimension  $j$ :

$$position_j = \frac{1}{n_j} \sum_{i=1}^{n_j} x_{ij} \quad (1)$$

The resulting user coordinates are represented by the grey dot labeled ‘You’ on the two-dimensional graph. Party positions are calculated in the same way, given each party’s answers to the same questions answered by the user. These are represented by official party colours and labels. Clicking on a party logo permits the user to view that party’s position on each issue and to compare that position to his or her answer.

The ellipse surrounding the user’s position is a simple measure of reliability. The length of the axis for each dimension  $j$  is the standard deviation of the questions  $x$ :

$$axis_j = \sqrt{\frac{1}{n_j} \sum_{i=1}^{n_j} (x_{ij} - position_j)^2} \quad (2)$$

## User and Party Position (“Weighted” by Issue Saliency)

Once the user enters the results page, he or she can recalculate the two-dimensional graph based on the issues that are most important to him or her by selecting “Enhance your Results”. The user is presented with the 30 Vote Compass questions and asked to select each one’s importance on a 0–10 scale. Once the user has completed this section, the two-dimensional graph is re-weighted by the attributed importance.

### Within-dimension Weighting

Before the user inputs the saliency for each issue, his or her responses are weighted uniformly within and across dimensions. Once the questions on issue saliency have been inputted, the graph is re-weighted both for the user and the parties.

This weighting is calculated for all questions  $x$  with weights  $w$  on dimension  $j$ :

$$position_j = \frac{\sum_{i=1}^{n_j} w_{ij} x_{ij}}{\sum_{i=1}^{n_j} w_j} \quad (3)$$

The axes of the ellipse are also re-weighted accordingly:

$$axis_j = \sqrt{\frac{\sum_{i=1}^{n_j} w_{ij} (x_{ij} - position_j)^2}{\sum_{i=1}^{n_j} w_{ij}}} \quad (4)$$

### Between-dimension Weighting

Before the user inputs the saliency for each issue, the two dimensions are weighted equally. Once values for the saliency of each question are inputted, there will not only be differences in saliency within dimensions, but also across them: a user may view social issues as more important than economic ones and vice versa. This is captured in the average level of issue saliency that is given by the user for each dimension. The relative importance of a dimension is taken as the average level of saliency for one dimension relative to the other. The greater the average saliency given for one dimension relative to another, the more the user is assumed to find that dimension salient more generally. The dimensions themselves are re-weighted to account for this difference.

To do this, the less salient dimension is weighted by ratio of its average saliency to the average level of saliency for the more salient dimension. Visually, this has the effect of compressing the dimension that is considered less important to the user, and places

the user’s coordinate closer to the party that is in greater agreement with the user on the more salient dimension.

It is important to note that this between-dimension weighting necessarily lowers the maximum value that the parties’ and user’s coordinates can be on the re-weighted dimension. The re-weighted graph is therefore a *relative* measure of ideological placement rather than an *absolute* one.

### Weighting the Party Answers

The parties are weighted, within and between dimensions, by the same vector of salience weights provided by the user. The algorithm places the user closer to the party to which the user agrees most on the salient issues and away from those parties he or she agrees with least. The more salient an issue, the closer the user moves to parties in agreement with his or her response. If an issue is given a salience value of 0, it is given 0 weight, effectively removing it as part of the dimension on which it is situated.

## 3 Issue Position Bar Graph

Like the two-dimensional graph, the issue-position bar graph has both an “unweighted” and weighted version. The bar graph measures the absolute distance of the user’s issue position to that of each party. Once the user indicates the relative importance of the 30 questions, the bar graph is weighted accordingly.

### Agreement with Party (Unweighted)

To calculate a user’s (dis)agreement with a party, the algorithm takes the sum of the absolute distances of the user’s positions  $x$  to the positions for those issues of party  $p$ :

$$disagreement_p = \sum_{i=1}^n \sqrt{(x_i - x_{ip})^2} \quad (5)$$

To determine the relative amount of a user’s (dis)agreement with each party, the algorithm first determines the maximum possible distance a party can be from the user, given the user’s answers:

$$maxDisagreement = \sum_{i=1}^n \sqrt{(x_i - 3)^2} + 2 \quad (6)$$

This equation centres the scale and takes the absolute value of a user's response to determine its distance from the centre. It adds 2, which is the maximum distance a party can be from the centre. By example, if a user answers '1', a party position of '5' is the maximum distance (4) from the user. If a user answers '2', a party position of '5' is the maximum distance (3) from the user. If a user answers '3', a party position of '1' or '5' is the maximum distance (2) from the user, and so forth. Thus, the equation finds the sum of the maximum distances a party can be from the user on each of the questions.

The final agreement score with each party  $p$  is calculated as follows:

$$score_p = \frac{maxDisagreement - disagreement_p}{maxDisagreement} \quad (7)$$

Thus, if party  $p$ 's positions are perfectly in line with the user for all questions, the user's agreement score with party  $p$  will be 1. If a party's positions are the maximum distance from a user's responses for all questions, the user's agreement score with party  $p$  will be 0.

## Agreement with Party (Weighted)

The introduction of weights  $w$  for issue salience are included in the calculation of  $disagreement_p$  as follows:

$$disagreement_p = \sum_{i=1}^n w_i \sqrt{(x_i - x_{ip})^2} \quad (8)$$

The calculation for the weighted  $maxDisagreement$  follows similarly:

$$maxDisagreement = \sum_{i=1}^n w_i (\sqrt{(x_i - 3)^2} + 2) \quad (9)$$

## 4 Party Leader Bar Graph

The party leader bar graph shows the average score given to each party leader across the three party leader questions.

## 5 Party Positions

The elaboration of the Vote Compass questionnaire follows a two-part research process. First, a content analysis is performed on the policy issues that figure most prominently in the platforms and public statements of the major political parties in the province, and in media discourse about provincial politics. From an initial list of questions, we select those to be included in the final questionnaire based on the questions' ability to differentiate between parties and amongst voters; their breadth of coverage across multiple policy fields; and their salience in the upcoming election.

Second, party positions in the Vote Compass questionnaire are derived from the parties' publicly available statements. The Vote Compass research team undertakes a comprehensive review of party documents, including manifestos, election platforms, websites, speeches, press releases, legislative debates, and statements to media, in order to impute an accurate representation of parties' stances on the policy issues explored in Vote Compass. Preference is accorded to public statements that are recent; come from either the parties themselves or their leaders; and are directly relevant to the policy issue in question. This calibration process is followed by a consultation with the parties themselves. These two steps are described more in detail below.

### The Calibration Process

Based on the collected public statements, researchers from the Vote Compass team are assigned to "code" or calibrate a given party's positions on each of the final questions included. To ensure inter-coder reliability (or the extent to which independent coders reach the same conclusions when assessing party positions), the researchers initially undertake this task separately and subsequently compare results for consistency. As all response categories are presented as Likert-type (or rating) scales, the following guidelines are used in the calibration process:

- **Strongly dis/agree, much less/more, many fewer/more, much harder/easier**  
If the party emphasizes the issue in question, and does not place any conditions, restrictions, doubts, etc. on its position.
- **Somewhat dis/agree, somewhat less/more, somewhat fewer/more, somewhat harder/easier**  
If the party does place conditions, restrictions, doubts, etc. on its position, or emphasizes only part of the proposition.
- **Neutral, about the same as now**  
If the party mentions the issue indirectly, and/or addresses the issue without consistent argumentation in support or in opposition.

To ensure that the results of this process are transparent for users, all party positions and supporting public statements (with URLs) are made available in the Vote Compass tool under “You vs. Party” and “Party vs. Party” on the results page. This information enables users to compare their own responses to those of the parties, and to delve more deeply into party platforms and public documents.

## Consultation with the Parties

Although party placements are based primarily on the process explained above, Vote Compass also consults with the political parties themselves as an additional check on our internal research. Parties are first sent a copy of the Vote Compass questionnaire, and invited to position themselves on the initial list of questions. Upon receipt of a completed questionnaire, Vote Compass reconciles the party’s self-placements with the calibrations determined by the research team coders. In the vast majority of cases, the calibrations from the party and the Vote Compass research team are in agreement. However, as discrepancies may exist, Vote Compass sends the party a reconciliation report outlining the confirmed calibrations and the disputed ones across the final Vote Compass questionnaire. All discrepancies are flagged and justified with the party’s public statement collected by the research team which supports the calibration proposed by Vote Compass.

The party is able to respond to each disputed calibration by clarifying its position and providing alternate public statements which support its self-placement on the issue in question. In cases where the party provides relevant policy statements which conclusively accord with its self-placement, Vote Compass will reposition the party on this issue. Where discrepancies are not resolved by this process, the disputed placements are sent for deliberation and final ruling to the Vote Compass Advisory Board, comprised of Canada’s foremost scholars in electoral politics. Parties are then sent final calibrations for review. They are able to challenge these calibrations and the supporting public statements throughout the entire run of Vote Compass. If a party’s stance on an issue changes or if a party wishes to provide additional official documentation not considered during the reconciliation process, we will revisit the appropriate calibration to determine if a change is warranted. Whatever the reason, we encourage parties to consult with us over the course of the election campaign if necessary. Every effort is made throughout the electoral campaign to ensure the accuracy of party calibrations based on their publicly available statements.

In the 2011 Ontario Vote Compass, all four parties acknowledged receipt of questionnaires; these were returned by the Liberal Party, the New Democratic Party, and the Green Party. The Progressive Conservative Party of Ontario acknowledged receipt of the questionnaire, but has not yet responded to the final calibrations. On 90 final statements (30 per party for three parties), four discrepancies were unresolved and a

final decision was made by the Advisory Board.

These disagreements and final calibrations were the following:

- **Liberal Party**

- Corporate income tax. The Liberal Party asked for a coding of ‘About the Same’. The Advisory Board chose a calibration of ‘Somewhat Less’.
- Extra tax on household products. The Liberal Party asked for a coding of ‘Strongly Disagree’. The Advisory Board chose a calibration of ‘Somewhat Disagree’.
- Convicted sex offenders and tracking devices. The Liberal Party asked for a coding of ‘Neutral’. The Advisory Board chose a calibration of ‘Somewhat Disagree’.

- **Green Party**

- Freezing public transit fares. The Green Party asked for ‘Somewhat Agree’. The Advisory Board chose a calibration of ‘Neutral’.