

# THE VOTE COMPASS ALGORITHM

## 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 political landscape. This graph consists of two ideological dimensions, as labeled on the “Results” page. The second element is an issue-position bar graph, which displays a user’s level of agreement with each party across the main Vote Compass attitudinal and policy-related 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 an acceptance of the reality that the political world—both among politicians and the public—is complex. It is this complexity that helps 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 its users to think through this complexity; to encourage those using Vote Compass to learn where parties stand on the issues and the reasons for why they do so; and to raise the level and quality of political information among the public 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 key Vote Compass attitudinal and policy-related questions

2. A user's responses concerning the importance of each set of issues

Each question is defined by the dimension on which it lies and by the side of the ideological spectrum that responses to that question indicate. This means that the same response to one question may differ in ideological direction from the same answer to another question. What each question indicates ideologically is determined through our analysis of data prior to the launch of Vote Compass.

#### USER AND PARTY POSITION (UNWEIGHTED)

Once a user has answered the key Vote Compass attitudinal and policy-related questions, his or her position in the political landscape is calculated by averaging the questions  $x_{ij}$  on their given 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 is the standard deviation of the questions on a dimension:

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

#### USER AND PARTY POSITION (WEIGHTED BY ISSUE SALIENCE)

Within the "Importance" section, the user is invited to evaluate the importance of each set of issues. Each set of issues is given a value by the user on a scale from 0 to 10. Once the user enters the results page, he or she can then weight the two-dimensional graph based on the importance of the issues by selecting "Weight Results." The graphs are re-weighted both for the user and the parties.

#### WITHIN-DIMENSION WEIGHTING

The weighting is calculated for all questions  $x_{ij}$  with weights  $w_{ij}$  as follows:

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

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 weights the two-dimensional graph by issue importance (saliency), the two dimensions are weighted uniformly. Once values for the importance of the issues are included, there will not only be differences in saliency within dimensions, but also across them: a user may view the issues on one dimension as more important than those on the other, or 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 to one dimension relative to the other, 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 the ratio of its average saliency to the average level of saliency for the more salient dimension (the size of the more salient dimension is normalized to fit the full length of the graph's axis). 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 closer to 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 saliency weights provided by the user. The algorithm places the user closer to the party which he or she agrees with 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 responses. If an issue is given a saliency 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 clicks "Weight Results", the bar graph is weighted according to issue importance.

#### AGREEMENT WITH PARTY (UNWEIGHTED)

To calculate a user's disagreement with the parties, the algorithm takes the sum of the absolute distances of the user's positions  $x_{i0}$  to the positions  $x_{ip}$  for each party  $p \in \{1 \dots P\}$ :

$$disagreement_p = \sum_{i=1}^n \sqrt{(x_{i0} - x_{ip})^2} \quad (5)$$

To calculate the relative amount of a user's disagreement with each party, the algorithm first determines the maximum possible distance a party can be from the user, given the user's answers:

$$maxDisagreement = \sum_{i=1}^n \sqrt{(x_{i0} - 3)^2} + 2 \quad (6)$$

This calculation 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, this calculation 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. i.e. For a score of zero, the party has issue positions as far as possible from the user, given the user's choice.

### AGREEMENT WITH PARTY (WEIGHTED)

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

$$disagreement_p = \sum_{i=1}^n w_i \sqrt{(x_{i0} - x_{ip})^2} \quad (8)$$

The calculation for the weighted  $maxDisagreement$  follows similarly:

$$maxDisagreement = \sum_{i=1}^n w_i (\sqrt{(x_{i0} - 3)^2} + 2) \quad (9)$$

## 4. PARTY LEADER BAR GRAPH

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

## 5. PARTY POSITIONS PER QUESTION

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, and in media discourse about politics and policies in general. 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. Specifically, public statements are prioritized by date, and in the following order:

1. A party's election platform
2. Official policy documents
3. Statements from the party leader; press releases from the party or party leader
4. Statements from elected party representatives linked to the policy domain in question

5. Statements from elected party representatives and current party candidates
6. A party's constitution; party-backed resolutions

Within these guidelines, allowances may be made for statements that most closely represent a party's position on the exact phrasing of a particular Vote Compass proposition. 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, 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**  
The party clearly emphasizes the issue in question and does not place any conditions, qualifications, or restrictions on its position.
- **Somewhat dis/agree, somewhat less/more, somewhat fewer/more, somewhat harder/easier**  
The party does place conditions, qualifications, or restrictions on its position; or emphasizes only part of the proposition.
- **Neutral, about the same as now**  
The party addresses the issue without consistent argumentation in favour or opposition; defers taking a position; and/or mentions the issue indirectly.

Calibrations on questions pertaining to taxes and spending are based on support for nominal change. In the event that a party supports an increase/decrease in taxes or spending that was passed in a prior sitting of the legislature but has yet to come into effect, this is still considered support for a nominal change.

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 such 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 the foremost scholars in the politics of the election. Parties are then sent final calibrations for review. They are able to dispute these calibrations and 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.

Throughout this process, therefore, there are several points of contact with each political party included in Vote Compass:

1. Each party is sent the Vote Compass questionnaire and invited to position themselves on the initial list of questions
2. Each party is engaged during the reconciliation of party self-calibrations and those determined by research team coders
3. Each party is sent a final report outlining party calibrations as they will appear in Vote Compass
4. Each party is invited to communicate with Vote Compass over the course of the campaign should their positions on key issues change