The Link between British Perceptions of Party Ideological Positions and Electoral Outcomes, 2017–20

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Abstract

In the wake of successive disappointing election performances by the UK Labour Party, commentators on the party's centre-right have argued that it can only be electorally successful if it is perceived as closer to the political centre than it was under leaders such as Jeremy Corbyn and Ed Miliband. These comments reiterate the received wisdom that, for a political party to be successful, it must be perceived as occupying an ideological centre ground. This political wisdom is derived from Anthony Downs' 'median voter theorem',[1] which states that 'a majority rule voting system will result in the outcome most preferred by the median voter'.[2] The following study tests this argument empirically by comparing voter estimations of the ideological positions of the Labour, Conservative, Green, and Liberal Democrat parties on the left–right ideological scale before the 2017 and 2019 General Elections and during polling carried out in June 2020.

Introduction

Discourse within the political commentariat, and the general public, often involves discussion of whether parties have moved towards the left or right because of leaders, political philosophies, or significant events such as Brexit or the 2008 financial crisis. Failure at the polls—such as the Labour Party's failure to win a majority in 2015 and 2019—is often attributed to a party shifting its position on this scale so that it is out of sync with the electorate. The UK Labour Party was accused of moving 'too far to the left' under Corbyn,[3] while Joe Biden was attacked on the campaign trail in the US as being not left-wing enough.[4] However, studies have suggested that it is actually quite rare for parties to shift significantly on the left–right ideological spectrum.[5] This raises the question: is there actually a correlation between a party's position on the left–right axis, as perceived by the mean voter, and electoral success? Do voters ignore ideological shifts when making electoral decisions—and is electoral perception of such shifts even accurate enough to allow informed decision making? The following study seeks to answer these questions by using a number of simple statistical tests and linear models to investigate the link between voter estimation of British parties' ideological positions on the Anthony Downs' scale,[6] and the electoral success of these parties. As a precursor to this analysis, the study also considers the conclusions of two previous studies on voter estimation of ideological position in Europe and Britain, and the influence these have on this study's

1 Anthony Downs, *An Economic Theory of Democracy.* (Harper and Row 1957).

2 Ed Fieldhouse, 'Is Labour really too left-wing to win an election?' (*British Election Study*, 2015) <https://www.britishelectionstudy.com/bes-findings/blog-update-is-labour-really-too-left-wing-to-win-an-election/#.YKz_Q42Sk2x> accessed 28 May 2021.

3 Tony Blair, 'If your heart is with Corbyn, get a transplant' *The Telegraph* (22 March 2016); Rajeev Syal, 'Ditch Corbyn's "misguided ideology" Tony Blair urges Labour' *Guardian* (18 December 2019).

4 'Why Progressives Think Joe Biden Is Not 'Electable' (*NPR,* 17 July 2019).

5 James Adams, 'A theory of spatial competition with biased voters: party policies viewed temporally and comparatively' (2001) 31(1) British Journal of Political Science 121; Ian Budge and Hans-Dieter Klingemann, 'Finally! Comparative over-time mapping of a party policy movement' in Ian Budge, Hans-Dieter Klingemann, and Andrea Volkens (eds), *Mapping Policy Preferences: Estimates for Parties, Electors and Governments 1945–1988* (Oxford University Press 2001).

6 Downs (n 1).

results. Ultimately this study finds that—based on the results of two previous general elections, pre-election surveys from these polls, and survey results after one year of Sir Keir Starmer's leadership of the Labour Party—the proximity of a party's perceived ideological position to that of the median, centrist voter, is a poor indicator of electoral success. The study also highlights that, in order to better understand the relationship between voter estimation of the ideological position of a party and electoral success, more data from smaller-scale electoral contests is required.

Theoretical background and previous studies

Before testing the hypothesis that, in the UK, the party which is perceived as being closest to the ideological centre ground does the best, it is necessary to consider some of the assumptions within this hypothesis.

The first of these is the assumption of a level of 'political knowledge' or 'political sophistication' within the electorate. Parties in Britain and many other Western democracies tend to be characterised as 'left', 'right', or 'centrist' on the two-dimensional scale described by Downs.[7] In Down's model, these labels describe, with broad strokes, the ideological positions held by parties which determine their stance on a range of policy issues. They let members of the electorate identify the party they are most closely aligned with without having to analyse the party's stance on individual issues.[8] Busch[9] points out that this model assumes voters can understand the ideological content of a party's positions and compare it with their own, rather than comparing the label itself, which may disguise significant differences between party and voter priorities. The same assumption is present within the argument made by centrist politicians such as Tony Blair[10] and Peter Mandelson[11] that the Labour Party can only win elections if it is perceived by the median voter as being closest to the median (centre) ideological position. This argument, like Downs' model of electoral decision making, relies on voters being able to understand the congruence between their own ideological stances, and their political parties'. However, research on voter perceptions of European parties and electoral decision making has suggested that the average voter does not notice when a party changes the ideological content of its manifesto.[12]

Similarly, several studies[13] have found that if individuals have strong positive or negative emotional predispositions to specific parties they tend to exaggerate the ideological similarity or difference between themselves and said party.[14] This undermines the core assumption of informed electoral decision-making of Downs' model and the arguments of Mandelson and Blair. Busch tests the hypothesis that voters are able to accurately perceive and compare the ideological position of a party with their own using multi-level linear modelling, identifying the individual-, party-, and system-level factors that influence the accuracy of voter estimations of ideological position.[15] Busch finds that voter estimation of a party's ideological position, and shifts in this position, is generally accurate. Changes in a party's political ideology around economic policy actually appear to improve accuracy. The greatest source of confusion to voter estimation was multiple parties significantly shifting ideological position simultaneously, which caused a decrease in estimation accuracy. Dahlberg suggests that if parties want to avoid voter confusion about their ideological position they should take distinctive positions, since the further from other parties they are, the clearer voter estimation is.[16] However, successful parties tend to try to have 'broad appeal' amongst the electorate by operating under as wide an ideological umbrella as possible,[17] which makes them harder to locate accurately on the left–right scale as ideological positions will inevitably overlap.

The second assumption made by commentators such as Blair and Mandelson is that the distance between the perceived ideological position of the Labour Party and the electoral median position, is greater than the distance between the same median position and the perceived ideological positions of other parties. Ed Fieldhouse considers this claim in a widely republished blog post for the British Electoral Survey.[18] Fieldhouse argues that the overall mean ideological position of the British Labour Party is less important than the difference between its position and that of the electoral median, or whether competing parties position themselves closer to this median. Fieldhouse uses data from the British Electoral Survey—the source from which this study's data is also drawn—to interrogate the claim made by Tony Blair that the Labour Party moved too far left under Ed Miliband and Jeremy Corbyn,[19] in the wake of the 2015 General Election, where Labour won 232 seats to the Conservatives' 330. His study is therefore a useful precursor to this paper. Fieldhouse's comparison of mean voter position on the ideological scale and mean voter estimation of Labour's position on the same scale showed that in 2015 Labour moved further away from the median voter than any time during the more electorally successful Blair years. This suggests that the received wisdom of Downs' model—and the arguments of Blair, Mandelson, and other centrists—may be correct. As Labour has moved further from the median, its electoral success has declined. However, Labour's perceived ideological position was actually 0.6 points to the right of its own voters'.[20] This is a good position for a party attempting to have a 'broad appeal' across the electorate.[21] Additionally, Fieldhouse's study showed that despite the Liberal Democrats being perceived

7 ibid.
8 Kathrin Barbara Busch, 'Estimating parties' left–right positions: Determinants of voters' perceptions' proximity to party ideology' (2016) 41 Electoral Studies 159.
9 ibid.
10 Blair (n 3).
11 Peter Mandelson, 'It's simply a myth that Labour can win from the left' *The Independent* (3 April 2021).
12 James Adams, Lawrence Ezrow, and Zeynep Somer-Topcu, 'Is anybody listening? Evidence that voters do not respond to European parties' policy statements during elections' (2011) 55(2) American Journal of Political Science 370; James Adams, Lawrence Ezrow, and Zeynep Somer-Topcu, 'Do voters respond to party manifestos or to a wider information environment? An analysis of mass-elite linkages on European integration' (2014) 58(4) American Journal of Political Science 967.
13 Andrew Drummond, 'Assimilation, contrast and voter projections of parties in the left–right space: does the electoral system matter?' (2010) 17(6) Party Politics 711; Donald Granberg and Soren Holmberg, T*he Political System Matters: Social Psychology and Voting Behaviour in Sweden and the United States* (Cambridge University Press 1988); Samuel Merrill, Bernard Groffman, and James Adams, 'Assimilation and contrast effects in voter projections of party locations: evidence from Norway, France and the USA' (2001) 40(9) European Journal of Political Research 1999.
14 Busch (n 8).
15 ibid.
16 Stefan Dahlberg, 'Does context matter - the impact of electoral systems, political parties and the individual characteristics on voters' perceptions of party positions' (2013) 32(4) Electoral Studies 670.
17 Zeynep Somer-Topcu, 'Everything to Everyone: The Electoral Consequences of the Broad-Appeal Strategy in Europe' (2014) 59(4) American Journal of Political Science 841.
18 Fieldhouse (n 2).
19 Blair (n 3).
20 ibid fig 4.
21 Fieldhouse (n 2); Somer-Topcu (n 17).

as the party ideologically closest to the median voter's position,[22] they still suffered an electoral collapse, losing 49 of their 57 seats in 2015. Additionally, while the Labour party was considered left-of-centre, they were still perceived as closer to the centre than the Conservative Party. The modal score of the Conservative Party was 8, compared to Labour's 3.[23] The Conservative Party's ideological position was also further to the right of Conservative supporters (0.9 points) than the Labour Party was from Labour supporters.[24] Fieldhouse concludes that there are more important factors in electoral success in Britain than perceived ideological position. This suggests that Labour's main challenge will be increasing its support by implementing new policies associated with conservative fiscal responsibility, whilst also keeping its established electoral base.

A brief overview of previous studies on voter estimation of ideological positions in the UK and Europe upholds the core assumption of the Downs model—that the average voter can accurately estimate the ideological position of a political party. However, it appears that, in the UK, the ability of voters to accurately estimate party positions does not necessarily mean they set great store by them when making electoral decisions. As Fieldhouse concludes, the proximity of a party's perceived ideological position to the median is a poor indicator of electoral success.

Method

The following section will lay out the steps taken in the treatment and analysis of data during this study. While the techniques used are simple, they can still reveal significant phenomena concerning voter estimation and electoral success.

Data

This study focuses exclusively on voter estimation in the United Kingdom. While restricting the applicability of the study's results, this also brings several benefits. The presence of multiple parties within the UK electoral system has been proven to make voter estimations of ideological position more accurate.[25] So has the presence of several established parties which have traditionally been associated with a specific area on the left–right axis.[26] The time frame studied (2017–20) was selected because, within it, multiple parties changed either their ideological position or party leader, and because it largely predates the confounding effects of the COVID-19 pandemic on electoral decision making. The raw data from the study was obtained from three waves of the British Electoral Study 2014–23: Wave 11 (April–May 2017), Wave 17 (November 2019), and Wave 20 (June 2020). The results of each survey were compared to the percentage vote share and number of seats won by four major parties (Labour, Conservative, Green, and Liberal Democrat) in the General Elections they preceded. Data from the Wave 20 survey was compared to YouGov polling on voter preferences carried out between 11 and 12 June 2020. Vote share was taken directly from polling, and the seat count this vote share would translate into was calculated using the online calculation tool at <electoralcalculus.co.uk>. By comparing mean estimated ideological position to both vote share and seat count, this study can resolve the effects of the first-past-the-post electoral system in the UK, whereby a party with a lower national vote than another may win more seats if its votes are concentrated in a smaller number of constituencies. The raw data was aggregated into a dataframe showing each respondent's answer to the question, 'In politics people sometimes talk of left and right. Where would you place the following parties on this scale?', for each of the political parties listed above, as well as the respondent's response when asked to give an estimation of their personal ideological position. Scores were given on a scale of 1–10, with 0 being the most left-wing and 10 the most right-wing position.[27]

Statistical test selection

The analysis of the resultant dataset was structured around three questions. Did voter perceptions of the ideological position of each party change significantly over time? Is there a correlation between a particular voter estimation score and electoral success? And finally: If such a relationship exists, could it be adequately modelled using a simple linear model? Having established a set of guiding research questions, the first step in the analysis was to check the distribution of the data using a Shapiro-Wilk test. This found that the data was not normally distributed (see Appendix I), and so non-parametric tests were used throughout this study. A Kruskal-Wallis test was used to test whether voter estimations of party ideological positions varied significantly over time, followed by a post hoc Wilcox rank sum test to identify where these specific differences lay. The Benjamini and Hochberg method[28] was used as the adjustment. It controls the false discovery rate rather than the more stringent family-wise error rate, which makes it a more powerful method than alternatives.[29] Following the Kruskal-Wallis test a Kendall's Tau correlation test was used to identify any cases of significant correlation between ideological position and electoral success amongst each party. Significance level was set at 0.05. Kendall's Tau was selected as the test, rather than Spearman's Rho, because it is less sensitive to error and the p-values it produces are more accurate at smaller sample sizes. A power analysis was carried out for each correlation test. Finally, a simple linear model with a fitted regression line was used to model the relationship between vote share or seat count, and voter estimation of a party's ideological position. A post hoc goodness of fit test was run to check the residuals of this model, with the effect size and test power also calculated.[30]

Results

Results in the first set were from the Kruskal-Wallis test for significant difference between voter estimations of ideological position in 2017, 2019, and 2020. The results are summarised in fig 1. We can see that, in the majority of cases, the perceived ideological position of each party has shifted in between each round of polling. The exception to this is voter estimation of the Liberal Democrats' position between 2017 and 2019. Respondents' self-estimations also appear to have shifted significantly, but only between 2017 and 2020. These results allow us to make several statements about shifting

22 Fieldhouse (n 2) fig 2.
23 ibid.
24 ibid.
25 Busch (n 8); Stacy B Gordon and Gary M Segura, 'Cross-national variation in the political sophistication of individuals: capability or choice?' (1997) 59(1) Journal of Politics 126; Giovanni Sartori, *Parties and Party Systems: A Framework for Analysis* (Cambridge University Press 1976).
26 Busch (n 8).
27 *British Election Study 2014-2023: Waves 1-20 Internet Panel Codebook* s l (2020) 303.
28 Yoav Benjamini and Yosef Hochberg, 'Controlling the False Discovery Rate: A Practical and Powerful Approach to Multiple Testing' (1995) 57(1) Journal of the Royal Statistical Society: Series B (Methodological) 289.
29 RDocumentation, *p.adjust: Adjust P-Values for multiple comparisons* (no date) <https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/p.adjust> accessed 29 May 2021.
30 fig 14.

ideological positions within different parties between 2017 and 2020. The Labour Party was perceived by the electorate as moving significantly to the left after the 2017 elections, at which it prevented the Conservative Party from winning a majority. However, it was perceived as having shifted further to the right than it was in 2017 after one year of Sir Keir Starmer's leadership. The replacement of Teresa May with Boris Johnson as Conservative leader and Prime Minister appears to have resulted in a small but significant shift to the right, followed by a sudden shift to the left by around 2.6 points between November 2019 and June 2020. This dramatic shift is probably the result of increased public spending and of the expansion of government regulation and policy into more sectors of public life as a result of the coronavirus pandemic. Other notable shifts include the leftward shift of the Liberal Democrats between 2017–20 (4.19–3.88), and the leftward shift of respondents over the same period (4.93–4.57). In summary, voters perceived a significant ideological shift in all four parties between 2017 and 2019, while shifting to the left by almost half a point themselves over the same period. These shifts are visualised in figs 3–6.

Having established that there were significant shifts in perceived ideological positions between 2017 and 2020, we can look to the results of our correlation tests to see if this change was significantly correlated to electoral outcomes.

The overall correlation tests between mean perceived ideological position and vote share or seat/MP count returned p-values of 0.2496 for Mean Score vs Vote Share and 0.1116 for seats won. This indicates that there is no significant correlation between the average perceived ideological position of a party and electoral success. However, a significant caveat to this result is that a power analysis of both sets of Kendall's Tau tests showed them to be very underpowered (fig 7), with scores well below 0.8, probably being a result of the small sample size (n=12) for the overall tests. The chance of these results being a false negative is therefore relatively high. The p-values returned by Kendall's Tau correlation tests for specific parties were all non-significant (see Appendix II). While their sample sizes (n=3) prevented power tests from being run, it can be assumed that small sample sizes will also have influenced these results. Despite the lack of a significant relationship, plotting our variables by political party still produces an interesting graphic (fig 8).

Even if we cannot confirm a significant relationship between perceived ideological position and electoral success, the coefficients from a linear model are informative. Fig 9 shows the coefficients and p-values for each linear relationship modelled.

While the p-values for our linear models show only four significant relationships, the coefficients indicate several interesting trends. For the overall linear model, the coefficients for both seats and

Political party	P-value 2017: 2019 pair	P-value 2017: 2020 pair	P-value 2019: 2020 pair
Labour	<2e-16	<2e-16	<2e-16
Conservative	2.9e-11	2e-16	2e-16
Green	7.2e-08	0.00017	< 2e-16
Liberal Democrat	0.044	<2e-16	<2e-16
Respondent Position	0.52	<2e-16	<2e-16

***Fig 1**. Summary table showing p-value for changes between estimated ideological position of parties in 2017, 2019, and 2020.*

Party	Year	Mean score	S d	Median score
Labour	2017	2.21	2.03	2
Labour	2019	1.88	2.02	2
Labour	2020	2.34	1.91	2
Conservative	2017	8.02	1.75	8
Conservative	2019	8.09	1.82	8
Conservative	2020	5.41	3.56	7
Green	2017	2.82	2.09	3
Green	2019	2.93	2.06	3
Green	2020	2.72	1.98	3
Lib Dem	2017	4.19	1.99	5
Lib Dem	2019	4.15	2.12	5
Lib Dem	2020	3.88	2.04	4
Individual	2017	4.93	2.6	5
Individual	2019	4.95	2.48	5
Individual	2020	4.57	2.34	5

***Fig 2**. Summary table of estimated ideological scores for political parties in 2017, 2019, and 2020.*

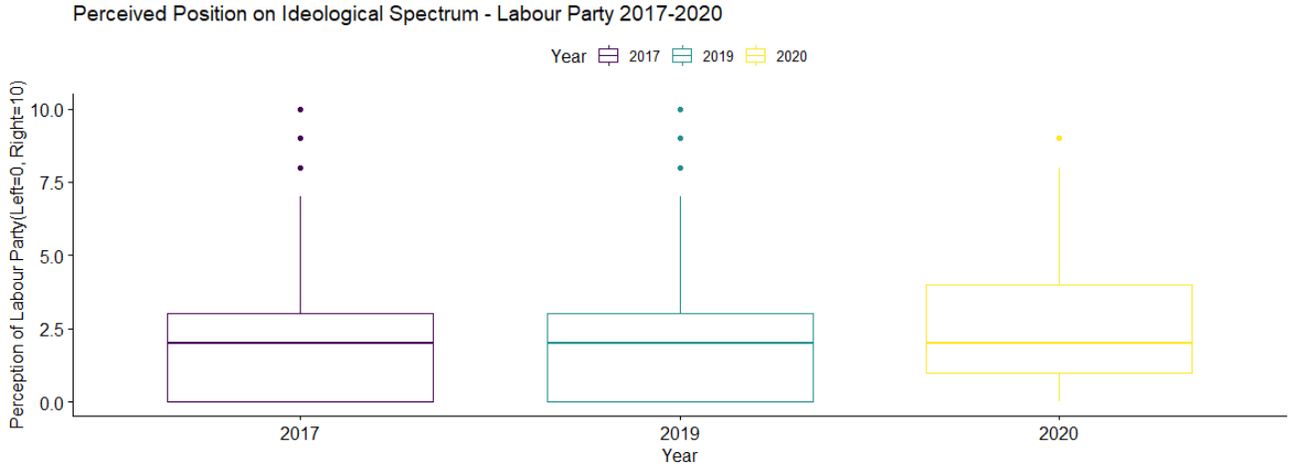

***Fig 3**. Boxplot of perceived position on the ideological spectrum for the Labour Party, 2017–20.*

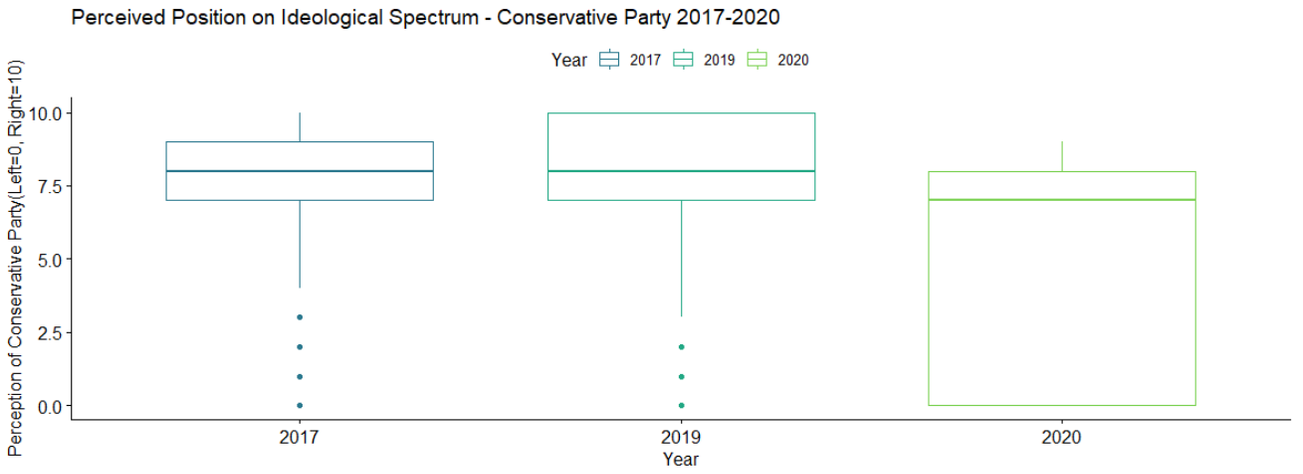

Fig 4. *Boxplot of perceived position on the ideological spectrum for the Conservative Party, 2017–20.*

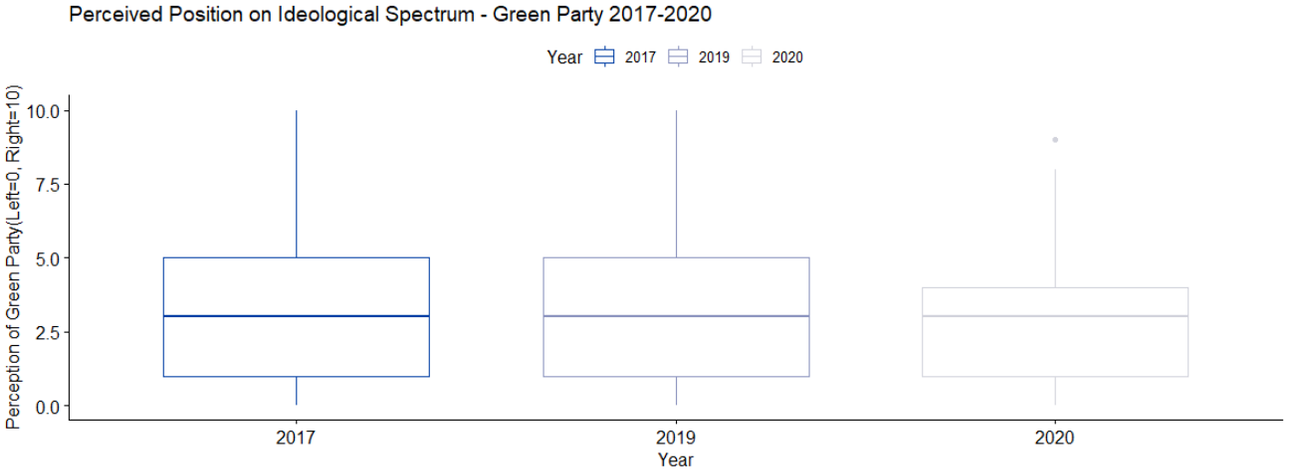

Fig 5. *Boxplot of perceived position on the ideological spectrum for the Green Party, 2017–20.*

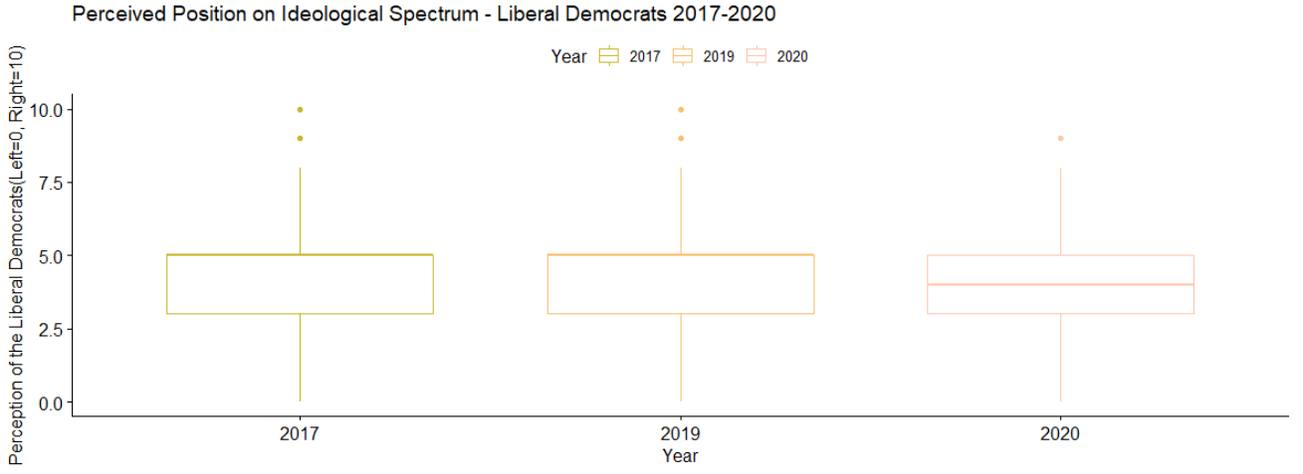

Fig 6. *Boxplot of perceived position on the ideological spectrum for the Liberal Democrats, 2017–20.*

Paired variables	P-value	Kendall's Tau	Power statistic
Mean perceived ideological position vs vote share (%)	0.2496	0.2727273	0.139482
Mean perceived ideological position vs seats/MPs won	0.1116	0.3566856	0.2123021

Fig 7. *Summary statistics for the Kendall's Tau correlation test of the overall dataset.*

vote share were positive, with every point shift towards the right gaining a party 3.8% of the national vote share, or 38 seats within the UK-wide electoral system. For the Labour Party this trend was more pronounced, with a single point shift towards the right modelled to net the party an extra 52 seats, or 13% of the vote. The Conservative Party, however, was not modelled to profit from any shifts to the right, with a one point shift costing them 4.7 seats and 0.7% of the vote. A heavy caveat to these figures, however, is that neither the Labour, Conservative, nor overall model had a p-value indicating a significant relationship. The coefficients for the Green Party Seats~MeanIDScore model suggest a flat regression line, but the Green Party would only ever

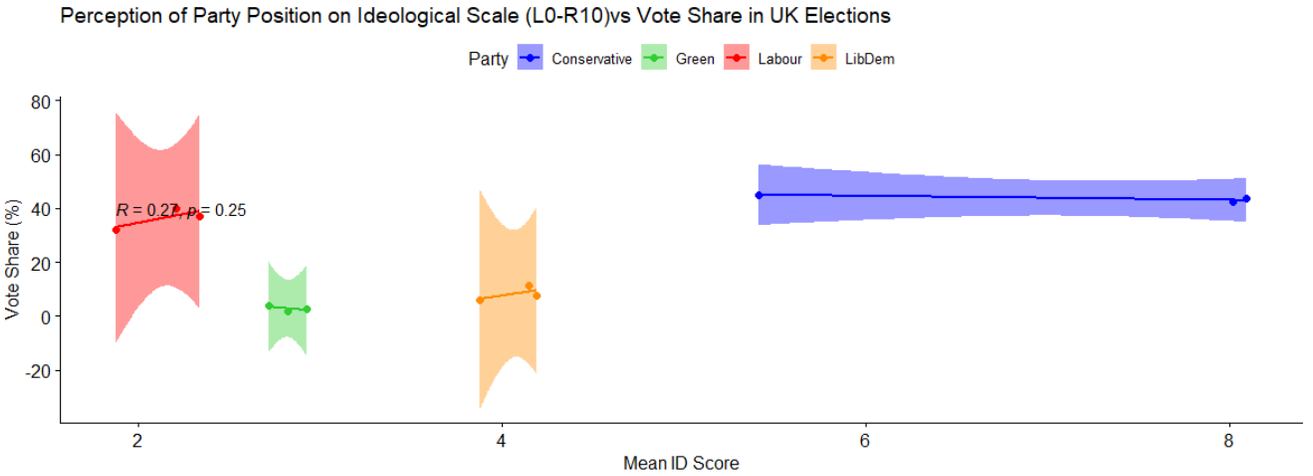

Fig 8. *Scatter plot of mean estimated ideological position of political parties (L0–R10) vs percentage vote share in the 2017 and 2019 UK general elections, and projected vote share in June 2020.*

Model	Coefficients (intercept)	Coefficients (mean ideological score)	P-value (intercept)	P-value (mean ideological score)
Overall seats	-12.04	38.87	0.894	0.0733
Overall vote share	7.33169	3.812083	0.528	0.154
Labour seats	113.56	52.46	0.741	0.742
Labour vote share	8.5	13.02	0.767	0.426
Cons seats	380.065	-4.749	0.184	0.811
Cons vote share	49.0233	-0.7467	0.00387	0.3197
Greens seats	1	0	<2e–16	N/A
Greens vote share	19.485	-5.921	0.609	0.654
Lib Dems seats	-96.2954	25.8499	0.00274	0.0025
Lib Dems vote share	-33.6	10.29	0.65	0.585

Fig 9. *Summary table of coefficients and p-values for linear models of mean estimated ideological score vs seats won and mean estimated ideological score vs vote share for individual political parties and for the overall dataset.*

win 1 seat, no matter what its mean estimated ideological position was. While this model produced significant p-values, common sense tells us it is implausible. The model for Green Party Vote Share~MeanIDScore appears to be better, indicating that Green Party vote share decreases by 5.9% for each perceived point further to the right. The linear model for Seats~MeanIDScore for the Liberal Democrats was the only model with a non-flat regression line to produce two significant p-values. It suggests the Liberal Democrats would gain 25.8 seats for every perceived point shift to the right, while the model for vote share (p-value:0.585) suggests such a shift would increase the party's share of the vote by 10.29%.

While the trends outlined above all suggested plausible relationships, even if most were statistically insignificant, there were some coefficient and p-value outputs which indicated that a linear modelling method was not always appropriate for modelling the relationship between estimated ideological position and electoral success. For example, the intercept coefficient for a linear model of Seats~MeanIDScore for the Conservative Party indicates that, if the Conservative Party had a mean estimated ideological score of 0 (as left-wing as possible), they would win 380 seats. This is clearly incorrect. Furthermore, post hoc goodness of fit testing suggests that the relationships suggested by the linear models do not encompass enough explanatory factors. Figs 12 and 13 show the residuals for the overall model plotted against fitted values. The value of the residuals for each model can clearly be predicted based on the fitted values, indicating that the model is missing explanatory information. However, power analysis of the overall models returned values of 0.94 for the Seats~MeanIDScore model

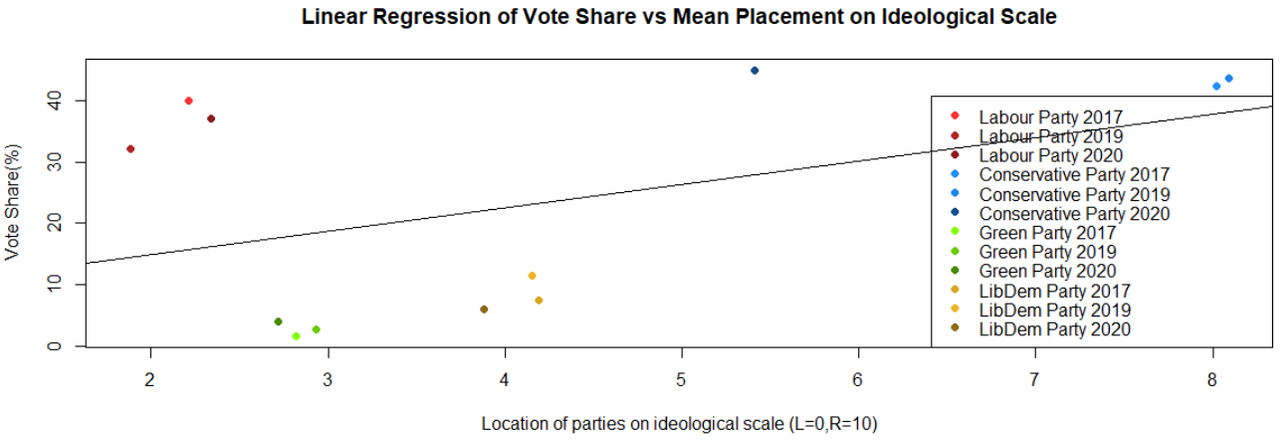

Fig 10. *Linear model of vote share vs mean estimated ideological score for overall dataset. Vote share attained by political parties in 2017, 2019, and 2020 plotted as individual points.*

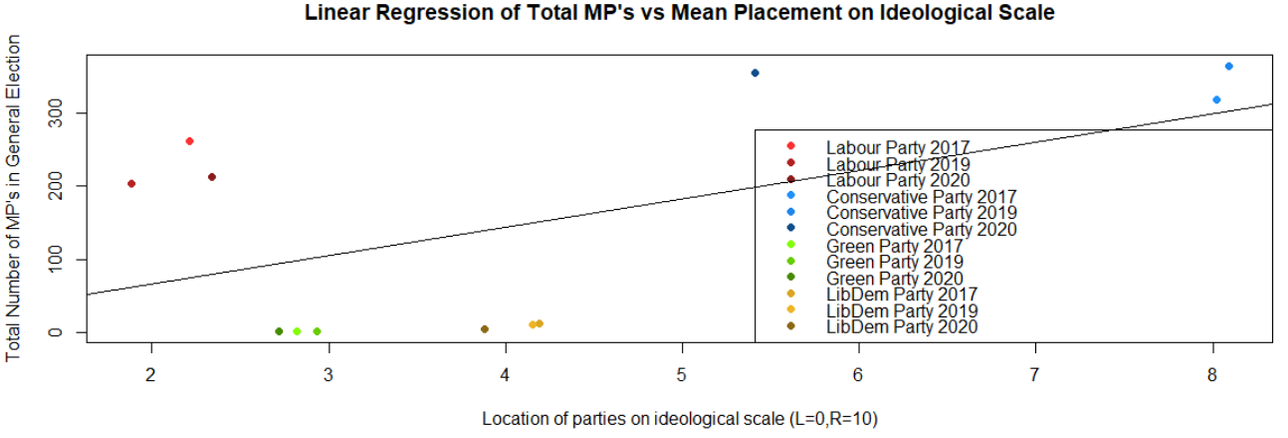

Fig 11. *Linear model of total MPs elected (seats won) vs mean estimated ideological score for overall dataset. Seats attained by political parties in 2017, 2019, and 2020 plotted as individual points.*

and 0.95 for the VoteShare~MeanIDScore model (fig 14), indicating the tests had sufficient explanatory power. This may be because, despite the small sample size and the absence of other explanatory variables, the effect size, calculated as Hedge's G (see fig 14), was large for both models. Goodness of fit tests, power analyses, and effect size calculation present a contradictory picture of how well linear models can describe the relationship between electoral outcomes and voter estimation of ideological position. Nonetheless, the R-squared and F-statistics (fig 14) indicate more clearly that linear regression modelling with only the mean voter estimated ideological score and an electoral outcome does not sufficiently explain our data. The R-squared statistic for the Seats~MeanIDScore model was 0.286 and 0.192 for the VoteShare~MeanIDScore model. This indicates that the linear models explain only 29 and 19 percent of the variability in electoral outcomes. The F-test p-value was greater than 0.05 for both overall models (fig 14), indicating that neither linear regression modelled a significant relationship. The only party-specific model with a significant F-test p-values was the Liberal Democrat Seats~MeanIDScore model. Therefore, although examining the coefficients of linear models provides us with a number of hypothetical relationships, linear regression modelling suggests these relationships are significant in only a small number of cases. The clearest result from linear modelling is that, in order to improve the effectiveness of this method, more data is needed. It could be gathered either by increasing the longitude of the study, or the granularity of the data—potentially looking at results at a constituency level.

Discussion and conclusion

Following the above analysis of data from the British Election Study 2014–23, we can draw several conclusions about the relationship between a party's perceived ideological position and its electoral success. The first key finding was that voter estimations of the ideological positioning of the four major political parties of the UK have shifted significantly between 2017 and 2020, and in most cases (Liberal Democrats excluded) shifted significantly between each set of surveys. This finding runs contrary to Adams[31] and Budge and Klingemann,[32] who suggest that significant shifts are rare. While the applicability of this trend outside the UK is not proven, it does confirm that the electorate perceives ideological repositioning amongst political parties as something that occurs relatively often in the UK.

31 Adams (n 5).
32 Budge and Klingemann (n 5).

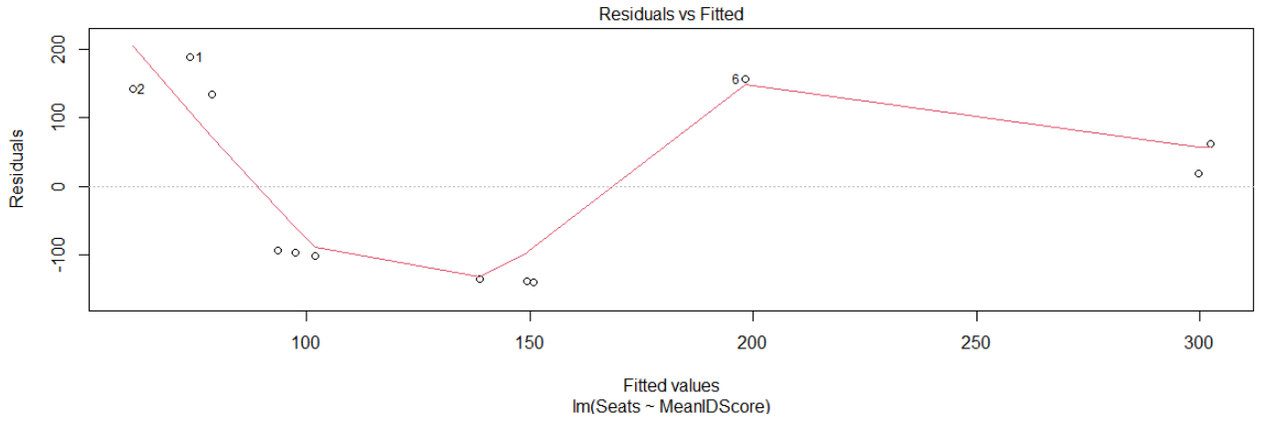

***Fig 12**. Plot of residuals vs fitted values for a linear model of seats won vs mean estimated ideological score derived from the overall dataset.*

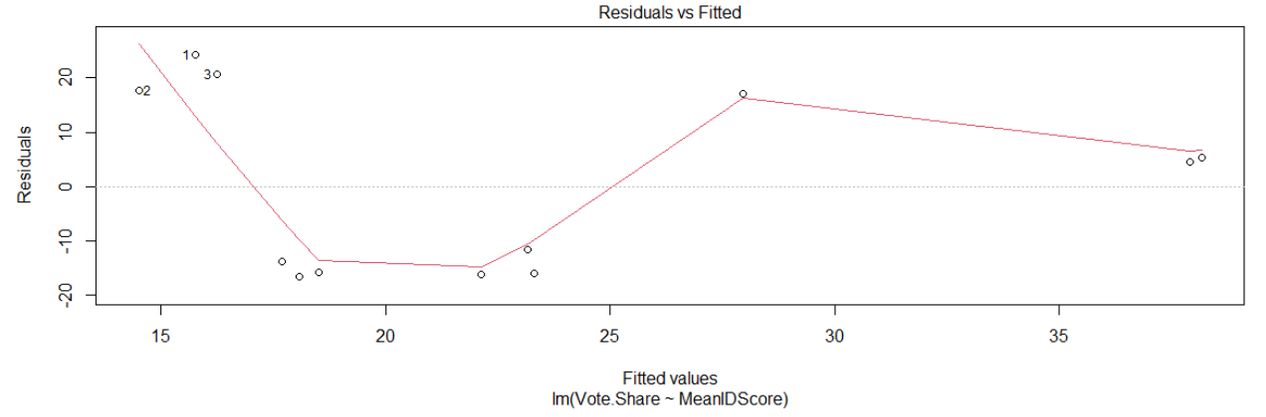

***Fig 13**. Plot of residuals vs fitted values for a linear model of vote share vs mean estimated ideological score derived from the overall dataset.*

The following findings, the most important, concern the relationship between these shifts and the electoral fortunes of the parties in question. Correlation testing on the level of both the electoral system and the individual parties found no significant correlation between a party's perceived ideological position and electoral outcomes. This suggests that, while commentators such as Blair and Mandelson might link the decline of Labour's electoral fortunes to a perceived leftward shift, there is no evidence in the data to support this. The same was true for the linear modelling approach, which found no statistically significant relationship between mean voter estimation of ideological position and electoral outcomes, except in one case (see fig 9). This study's most statistically robust results were associated with modelling of the Liberal Democrat party (figs 9 and 14), which suggested that shifting a point to the right could increase the party's seat count by 25.8 seats. This directly contradicts the centrist mantra that parties should strive to be perceived as closest to the median voter. The Liberal Democrats scored 4.43 on average between 2017 and 2020, by far the closest average score to the average self-estimation by respondents across the same period (4.82) (see fig 2). This trend may illustrate Dahlberg's argument that parties which adopt more distinctive ideological positions are easier for voters to recognise ideologically, and hence easier to identify with.[33] Further evidence can be found in the modelled results for

Linear model	Power statistic	Effect size (Hedge's G)	R-squared value	F-test p-value
Overall model: seats	0.936	1.252	0.286	0.073
Overall model: vote share	0.955	1.376	0.192	0.154
Labour seats	0.3	8.021	0.155	0.742
Labour vote share	0.33	9.833	0.616	0.426
Conservative seats	<0.8	15.454	0.086	0.811
Conservative vote share	<0.8	20.576	0.768	0.32
Green seats*	<0.8	-19.64	N/A	N/A
Green vote share	<0.8	-0.053	0.268	0.654
Liberal Democrat seats	<0.8	1.278	1	0.003
Liberal Democrat vote share	<0.8	1.67	0.368	0.585

***Fig 14**. Summary table of post hoc test outputs for linear models.*
** Model was a perfect fit because of flat regression line.*

33 Dahlberg (n 16).

the Green Party, which lost 5.9% of its national vote share for every point it moved away from its clear left-wing position (2.82 across all three years) towards the centre, where its position would overlap with Labour and potentially the Liberal Democrats.

A methodological issue which prevented more conclusions being drawn from the correlation analysis and linear modelling was the lack of statistical power when testing and modelling at the level of individual parties. This was probably down to two factors: the simplicity of the models, which used only one independent variable, and the small sample size of the data. These factors led to some results being clearly inappropriate, such as the linear model suggesting a far-left Conservative Party would win 380 seats. Similarly, the linear model describing the relationship between the Green Party's seat count and ideological position was clearly impacted by the Greens' consistent score of 1 seat regardless of vote share, leading to a flat regression line and a meaningless model. However, as always with hypothesis testing, the failure of our models also points us towards useful conclusions. There are two notable failure-driven conclusions. 1) Perceived ideological position alone is not a sufficient predictor variable of electoral success. 2) Research in this area would benefit from using data on the relative electoral success of parties, either a greater number of administrative levels (council, mayoralty etc) or from a greater breadth of electoral contests (local council elections, mayoral races, devolved-administration elections).

The key finding of this study is as follows: there is no evidence to support the centrist mantra that the party perceived as being ideologically closest to the median voter will have the best electoral outcomes. There is no significant correlation or relationship between how the electorate perceives a party's ideological position and how well it does at the polls. This confirms what Fieldhouse[34] suggested when investigating the issues facing the Labour party after the loss of the 2015 general election. Instead, it appears that other explanatory factors are of greater importance in determining which parties individuals vote for. These factors account for the 70–80% of variability in electoral outcomes that is not explained by the impact of perceived ideological positions within the linear models (fig 14). These other 'explanatory factors' may be valence issues, such as which party has the best leader or is the most charismatic, which are often primed as being significant by the media during election campaigns.[35] While focus by the media on leadership and personality issues does not detract from voters' abilities to accurately estimate the ideological position of parties,[36] it could very well alter their priorities when it comes to the issues which bear heavily on electoral decision making. In summary, this study's conclusions suggest that politicians who advocate recreating a party's ideological position in line with the mythical 'median voter' are sacrificing the useful asset of ideological recognisability for little to no electoral gain.

34 Fieldhouse (n 2).

35 Busch (n 8); Elisabeth Gidengil, Andre Blais, Neil Nevitte, and Richard Nadeau, 'Priming and campaign context: evidence from recent Canadian elections' in David M Farrell and Rudiger Schmitt-Beck (eds), *Do Political Campaigns Matter? Campaign Effects in Elections and Referendums* (Routledge 2002).

36 Busch (n 8); Danny Hayes, 'Has television personalised voting behaviour?' (2008) 31 Political Behaviour 231; Max Kaase, 'Is there personalization in politics? Candidates and voting behaviour in Germany' (1994) 15 International Political Science Review 211; Klaus Schoenbach, 'The "Americanization" of German election campaigns: any impact on the voters?' in David L Swanson and Paolo Mancini (eds), *Politics, Media and Modern Democracy* (Praeger Publishers 1996).

Appendix I: Shapiro-Wilk normality test results

Shapiro-Wilk normality test

data: NormalTest2017Lab
W = 0.88669, p-value < 2.2e-16
shapiro.test(NormalTest2017Con)
Shapiro-Wilk normality test

data: NormalTest2017Con
W = 0.85698, p-value < 2.2e-16
shapiro.test(NormalTest2017Greens)
Shapiro-Wilk normality test

data: NormalTest2017Greens
W = 0.93257, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2017LD
W = 0.94439, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2017Self
W = 0.96415, p-value < 2.2e-16
shapiro.test(NormalTest2019Lab)
Shapiro-Wilk normality test

data: NormalTest2019Lab
W = 0.83963, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2019Con
W = 0.84651, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2019greens
W = 0.94, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2019LD
W = 0.94829, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2019Self
W = 0.97034, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2020Lab
W = 0.91648, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2020Con
W = 0.75904, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2020greens
W = 0.93417, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2020LD
W = 0.93274, p-value < 2.2e-16
Shapiro-Wilk normality test

data: NormalTest2020Self
W = 0.96252, p-value < 2.2e-16
#Overall Datasets
shapiro.test(ElectoralScore$Seats)
Shapiro-Wilk normality test

data: ElectoralScore$Seats
W = 0.79694, p-value = 0.008648
shapiro.test(ElectoralScore$Vote.Share)
Shapiro-Wilk normality test

data: ElectoralScore$Vote.Share
W = 0.81068, p-value = 0.01242
shapiro.test(ElectoralScore$MeanIDScore)
Shapiro-Wilk normality test

data: ElectoralScore$MeanIDScore
W = 0.83635, p-value = 0.025

Appendix II: Kendall's Tau correlation test results

#Kendall's Tau Mean IDScore and Vote Share

cor.test(LabourVotes$MeanIDScore,LabourVotes$Vote.Share,method="kendall")

Kendalls rank correlation tau

data: LabourVotes$MeanIDScore and LabourVotes$Vote.Share
T = 2, p-value = 1

```
alternative hypothesis: true tau is not equal to 0
sample estimates:
      tau
0.3333333
------
Kendalls rank correlation tau

data:  ConservativeVotes$MeanIDScore and ConservativeVotes$Vote.Share
T = 1, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
  tau
-0.3333333
------
Kendalls rank correlation tau

data:  LibDemVotes$MeanIDScore and LibDemVotes$Vote.Share
T = 2, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
      tau
0.3333333
------------
Kendalls rank correlation tau

data:  GreenVotes$MeanIDScore and GreenVotes$Vote.Share
T = 1, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
  tau
-0.3333333
#Kendall's Tau MeanID Score and Seats
cor.test(LabourVotes$MeanIDScore,LabourVotes$Seats,method="kendall")

Kendalls rank correlation tau

data:  LabourVotes$MeanIDScore and LabourVotes$Seats
T = 2, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
      tau
0.3333333
-----
Kendalls rank correlation tau

data:  ConservativeVotes$MeanIDScore and ConservativeVotes$Seats
T = 2, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
  tau
0.3333333
----------
Kendalls rank correlation tau

data:  LibDemVotes$MeanIDScore and LibDemVotes$Seats
T = 3, p-value = 0.3333
alternative hypothesis: true tau is not equal to 0
sample estimates:
tau
  1
-------
N/A for Green Party as SD for Seats = 0
---------
#Overall dataset
  cor.test(ElectoralScore$MeanIDScore,ElectoralScore$Vote.Share,method="kendall")
Kendalls rank correlation tau
data:  ElectoralScore$MeanIDScore and ElectoralScore$Vote.Share
T = 42, p-value = 0.2496
alternative hypothesis: true tau is not equal to 0
sample estimates:
      tau
0.2727273

cor.test(ElectoralScore$MeanIDScore,ElectoralScore$Seats,method="kendall")
                    Kendalls rank correlation tau
data:  ElectoralScore$MeanIDScore and ElectoralScore$Seats
z = 1.5909, p-value = 0.1116
alternative hypothesis: true tau is not equal to 0
sample estimates:
  tau
0.3566856
```

Appendix III: R code for replicating results

```
#Import data from SPSS

Nov2019PrePoll<-read.spss("Nov2019PrePoll.sav",use.value.label=TRUE)

#Create dataset of estimation of part placement on spectrum

Nov2019LeftRight<-data.frame(Nov2019PrePoll$lrLab,Nov2019PrePoll$lrCon,Nov2019Pre-
Poll$lrgreens,Nov2019PrePoll$lrLD,Nov2019PrePoll$leftRight)

#Eliminate 'Don't Know's' from the data

Nov2019LeftRight<-subset(Nov2019LeftRight,Nov2019LeftRight$Nov2019PrePoll.lrLab!="-
Don't know"&Nov2019LeftRight$Nov2019PrePoll.lrCon!="Don't know"&Nov2019Lef-
tRight$Nov2019PrePoll.lrgreens!="Don't know"&Nov2019LeftRight$Nov2019PrePoll.lrLD!="Don't
know"&Nov2019LeftRight$Nov2019PrePoll.leftRight!="Don't know")

#Replace the levels "Left" and "Right" with "0" and "10" respectively using the 'revalue'
function from 'plyr' package.

install.packages("plyr")
library(plyr)

#Example code

Nov2019LeftRight$Nov2019PrePoll.lrLab<-revalue(Nov2019LeftRight$Nov2019PrePoll.
lrLab,c("Left"="0","Right"="10"))

#We can check that revaluing the levels does not eliminate them from the data

ConRight2019=subset(Nov2019LeftRight,Nov2019LeftRight$Nov2019PrePoll.lrCon=="Right")
nrow(ConRight2019)
[1] 5548
Nov2019LeftRight$Nov2019PrePoll.lrCon<-revalue(Nov2019LeftRight$Nov2019PrePoll.
lrCon,c("Left"="0","Right"="10"))
ConRight20192=subset(Nov2019LeftRight,Nov2019LeftRight$Nov2019PrePoll.lrCon=="10")
nrow(ConRight20192)
[1] 5548

#Once levels for all columns are revalued we need to ensure that the levels are read as
numeric

Nov2019LeftRight$Nov2019PrePoll.lrLab<-as.numeric(as.character(Nov2019Lef-
tRight$Nov2019PrePoll.lrLab))

#Repeat for all columns (factors)
#Format data in this way for 2017, 2019 and 2021 elections
#Next step is to check whether data is normal or non-normal
#See Appendix I for Normality Test results
#All of our data is non-normally distributed, so we will use non-parametric tests.
#Create a data frame with results from each party across all 3 polls.

nrow(Election2017LeftRight)
[1] 19628
> nrow(Nov2019LeftRight)
[1] 20835
> nrow(June2020LeftRight)
[1] 19789
LabScores<-c(Election2017LeftRight$Election2017.lrLab,Nov2019LeftRight$Nov2019PrePoll.
lrLab,June2020LeftRight$June2020.lrLab)
Year<-rep(c("2017","2019","2020"),times=c(19628,20835,19789))
Labour<-data.frame(LabScores,Year)

#Install 'dplyr' package

install.packages("dplyr")
library(dplyr)

#Get summary statistics by group (year)

group_by(Labour,Year) %>%
  summarise(
    count = n(),
    mean = mean(LabScores, na.rm = TRUE),
    sd = sd(LabScores, na.rm = TRUE),
    median = median(LabScores, na.rm = TRUE),
    IQR = IQR(LabScores, na.rm = TRUE)
  )
Year  count  mean   sd   median  IQR
  <ord> <int> <dbl>  <dbl>  <dbl> <dbl>
1 2017  19628  2.21  2.03     2    3
2 2019  20835  1.88  2.02     2    3
3 2020  19789  2.34  1.91     2    3
----
Conservatives
  Year  count  mean  sd   median  IQR
  <chr> <int>  <dbl> <dbl>  <dbl> <dbl>
1 2017  19628  8.02  1.75     8    2
2 2019  20835  8.09  1.82     8    3
3 2020  19789  5.41  3.56     7    8
----
Green
  Year  count  mean   sd median  IQR
  <chr> <int> <dbl> <dbl>  <dbl> <dbl>
1 2017  19628  2.82  2.09     3    4
2 2019  20835  2.93  2.06     3    4
3 2020  19789  2.72  1.98     3    3
-----
LibDem
  Year  count  mean  sd   median  IQR
  <chr> <int> <dbl> <dbl>  <dbl> <dbl>
1 2017  19628  4.19  1.99     5    2
2 2019  20835  4.15  2.12     5    2
3 2020  19789  3.88  2.04     4    2
---
```

```
Individual
  Year  count  mean   sd  median  IQR
  <chr> <int> <dbl> <dbl>  <dbl> <dbl>
1 2017  19628  4.93  2.60      5     4
2 2019  20835  4.95  2.48      5     4
3 2020  19789  4.57  2.34      5     3
```

#Install ggpubr and viridis packages for nice box plots

```
install.packages("ggpubr")
install.packages("curl")
library(curl)
library(ggpubr)
library(viridis)
library(colorspace)

#Create boxplot by year

col.vir=viridis(6)
col.div<-diverge_hcl(6)
col.terr<-terrain_hcl(6)
col.seq<-sequential_hcl(6)
col.rain<-rainbow_hcl(6)
ggboxplot(Labour, x ="Year", y ="LabScores",color = "Year", palette=col.vir,,order = c("2017", "2019",
"2020"),ylab = "Perception of Labour Party(Left=0, Right=10)", xlab = "Year",main= "Perceived
Position on Ideological Spectrum - Labour Party 2017-2020")
```

#Now we can perform our Kruskal-Wallis test

```
kruskal.test(LabScores~Year,data=Labour)
Kruskal-Wallis rank sum test

data:  LabScores by Year
Kruskal-Wallis chi-squared = 884.87, df = 2, p-value < 2.2e-16
-------
kruskal.test(Conscores~Year,data=Conservative)
Kruskal-Wallis rank sum test

data:  Conscores by Year
Kruskal-Wallis chi-squared = 8461.6, df = 2, p-value < 2.2e-16
----
kruskal.test(GreenScores~Year,data=Green)
  Kruskal-Wallis rank sum test

data:  GreenScores by Year
Kruskal-Wallis chi-squared = 89.121, df = 2, p-value < 2.2e-16
---
kruskal.test(LibDemScores~Year,data=LibDem)
Kruskal-Wallis rank sum test

data:  LibDemScores by Year
Kruskal-Wallis chi-squared = 174.61, df = 2, p-value < 2.2e-16
----
  kruskal.test(IndividualScores~Year,data=Individual)
Kruskal-Wallis rank sum test

data:  IndividualScores by Year
Kruskal-Wallis chi-squared = 210.98, df = 2, p-value < 2.2e-16
```

#If P-Value indicates significance follow up with a Wicox sum rank test

```
pairwise.wilcox.test(Labour$LabScores,Labour$Year,p.adjust.method = "BH")

  Pairwise comparisons using Wilcoxon rank sum test with continuity correction

data:  Labour$LabScores and Labour$Year

     2017   2019
2019 <2e-16 -
2020 <2e-16 <2e-16
-----
data:  Conservative$Conscores and Conservative$Year

      2017    2019
2019 2.9e-11 -
2020 < 2e-16 < 2e-16

P value adjustment method: BH
----
data:  Green$GreenScores and Green$Year

       2017    2019
2019 7.2e-08 -
2020 0.00017 < 2e-16
P value adjustment method: BH
-----
  data:  LibDem$LibDemScores and LibDem$Year

     2017   2019
2019   0.044  -
2020 <2e-16 <2e-16

P value adjustment method: BH
----
  data:  Individual$IndividualScores and Individual$Year

     2017   2019
2019 0.52     -
2020 <2e-16 <2e-16

P value adjustment method: BH
```

#Having now completed a non-parametric ANOVA to see if there is a significant change in ideological perception of parties and self over time we can move on to correlation.
#Load new data

```
ElectoralScore<-read.csv("ElectoralScores.csv")
```

#Shapiro-Wilk test for normality (See Appendix I, 'Overall Dataset' results).
#We'll use a non-parametric Kendall's Tau test, as at least 1 variable will always be non-normally distributed.
#Lets check the method works by seeing if it can detect the strong positive correlation between Vote share and seats won

```
cor.test(ElectoralScore$Seats,ElectoralScore$Vote.Share,method="kendall")

Kendalls rank correlation tau

data:  ElectoralScore$Seats and ElectoralScore$Vote.Share
z = 4.0811, p-value = 4.482e-05
alternative hypothesis: true tau is not equal to 0
sample estimates:
     tau
0.9149761
```

#Huzzah. Now we create subsets

```
LabourVotes<-subset(ElectoralScore,ElectoralScore$Party=="Labour")
ConservativeVotes<-subset(ElectoralScore,ElectoralScore$Party=="Conservative")
LibDemVotes<-subset(ElectoralScore,ElectoralScore$Party=="LibDem")
GreenVotes<-subset(ElectoralScore,ElectoralScore$Party=="Green")
```

#Kendall's Tau for perception vs vote share

```
cor.test(LabourVotes$MeanIDScore,LabourVotes$Vote.Share,method="kendall")

Kendalls rank correlation tau

data:  LabourVotes$MeanIDScore and LabourVotes$Vote.Share
T = 2, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
     tau
0.3333333
------
                Kendalls rank correlation tau

data:  ConservativeVotes$MeanIDScore and ConservativeVotes$Vote.Share
T = 1, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
  tau
-0.3333333
------
  Kendalls rank correlation tau

data:  LibDemVotes$MeanIDScore and LibDemVotes$Vote.Share
T = 2, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
     tau
0.3333333
------------
                Kendalls rank correlation tau

data:  GreenVotes$MeanIDScore and GreenVotes$Vote.Share
T = 1, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
  tau
-0.3333333
```

#All correlation tests suggest no significant correlation between ID Score and Vote Share.
#Kendall's Tau ID Score and Seats

```
cor.test(LabourVotes$MeanIDScore,LabourVotes$Seats,method="kendall")

Kendalls rank correlation tau

data:  LabourVotes$MeanIDScore and LabourVotes$Seats
T = 2, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
     tau
0.3333333
-----
Kendalls rank correlation tau

data:  ConservativeVotes$MeanIDScore and ConservativeVotes$Seats
T = 2, p-value = 1
alternative hypothesis: true tau is not equal to 0
sample estimates:
```

```
 tau
0.3333333
----------
 Kendalls rank correlation tau

data:  LibDemVotes$MeanIDScore and LibDemVotes$Seats
T = 3, p-value = 0.3333
alternative hypothesis: true tau is not equal to 0
sample estimates:
tau
 1
-------
N/A for Green Party as SD for Seats = 0
---------
```

#If we look at the overall dataset there is also no significant correlation between ID Score and vote share or seats

```
 cor.test(ElectoralScore$MeanIDScore,ElectoralScore$Vote.Share,method="kendall")

Kendalls rank correlation tau

data:  ElectoralScore$MeanIDScore and ElectoralScore$Vote.Share
T = 42, p-value = 0.2496
alternative hypothesis: true tau is not equal to 0
sample estimates:
    tau
0.2727273

cor.test(ElectoralScore$MeanIDScore,ElectoralScore$Seats,method="kendall")

                Kendalls rank correlation tau

data:  ElectoralScore$MeanIDScore and ElectoralScore$Seats
z = 1.5909, p-value = 0.1116
alternative hypothesis: true tau is not equal to 0
sample estimates:
 tau
0.3566856
--------
```

 # We can plot our overall data correlation between ID Score and seats/vote share as a scatterplots

```
ggscatter(ElectoralScore, x = "MeanIDScore", y = "Vote.Share",add = "reg.line", conf.int = TRUE,cor.coef = TRUE, cor.method = "kendall", xlab = "Mean ID Score", ylab = "Vote Share (%)",title="Perception of Party Position on Ideological Scale (L0-R10)vs Vote Share in UK Elections")
```

#And grouped by party

```
ggscatter(ElectoralScore, x = "MeanIDScore", y = "Vote.Share",
+          add = "reg.line", conf.int = TRUE,
+          cor.coef = TRUE, cor.method = "kendall",color="Party",palette = c("blue","lime-green","red","darkorange"),xlab = "Mean ID Score", ylab = "Vote Share (%)",main="Perception of Party Position on Ideological Scale (L0-R10)vs Vote Share in UK Elections")
```

#We can also perform a power analysis of our correlation tests, using the effect sizes calculated below.

```
install.packages("pwr")
library(pwr)
------------
VoteShareCorrPower<-pwr.r.test(n=12,r=0.2727273,sig.level=0.05)

approximate correlation power calculation (arctangh transformation)

n = 12
r = 0.2727273
sig.level = 0.05
power = 0.139482

SeatsCorrPower$power
[1] 0.2123021
alternative = two.sided
```

#Unfortunately, sample size for subsets is too small (<4) but we can assume they will be underpowered.
 # Now, lets create some linear models with seats/vote share as the DEPENDENT variable (LEFT of tilde), and ID Score as the INDEPENDENT VARIABLE (RIGHT of tilde)

```
OverallmodelVoteShare<-lm(Vote.Share~MeanIDScore,data=ElectoralScore)
```

#Get confidence intervals

```
confint(OverallmodelVoteShare)
                2.5 %    97.5 %
  (Intercept) -17.64976 32.313140
MeanIDScore  -1.69757  9.321735
confint(OverallmodelSeats)
                 2.5 %    97.5 %
  (Intercept) -208.305773 184.22983
MeanIDScore   -4.420539  82.15309
```

#Get R-Squared stats etc...

```
summary(OverallmodelVoteShare)

Call:
 lm(formula = Vote.Share ~ MeanIDScore, data = ElectoralScore)

Residuals:
  Min     1Q  Median     3Q     Max
-16.482 -15.827  -3.578  17.209  24.244

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)    7.332     11.212   0.654    0.528
MeanIDScore    3.812      2.473   1.542    0.154

Residual standard error: 17.41 on 10 degrees of freedom
Multiple R-squared:  0.192,     Adjusted R-squared:  0.1112
F-statistic: 2.377 on 1 and 10 DF,  p-value: 0.1542

summary(OverallmodelSeats)

Call:
 lm(formula = Seats ~ MeanIDScore, data = ElectoralScore)

Residuals:
  Min     1Q  Median     3Q     Max
-138.81 -109.32  -37.17  136.06  188.14

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)   -12.04      88.09  -0.137   0.8940
MeanIDScore    38.87      19.43   2.001   0.0733 .
---
 Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 136.7 on 10 degrees of freedom
Multiple R-squared:  0.2858,    Adjusted R-squared:  0.2144
F-statistic: 4.002 on 1 and 10 DF,  p-value: 0.07332
------------
```

#Now model subsets

```
LabourmodelSeats<-lm(Seats~MeanIDScore,data=LabourVotes)
LabourmodelVoteShare<-lm(Vote.Share~MeanIDScore,data=LabourVotes)
ConservativemodelSeats<-lm(Seats~MeanIDScore,data=ConservativeVotes)
ConservativemodelVoteShare<-lm(Vote.Share~MeanIDScore,data=ConservativeVotes)
LibDemmodelVoteShare<-lm(Vote.Share~MeanIDScore,data=LibDemVotes)
LibDemmodelSeats<-lm(Seats~MeanIDScore,data=LibDemVotes)
GreenmodelVoteShare<-lm(Vote.Share~MeanIDScore,data=GreenVotes)
GreenmodelSeats<-lm(Seats~MeanIDScore,data=GreenVotes)
OverallmodelSeats<-lm(Seats~MeanIDScore,data=ElectoralScore)
```

#Plot overall model

```
plot(ElectoralScore$MeanIDScore,ElectoralScore$Vote.Share,ylab="Vote Share(%)",xlab="Location of parties on ideological scale (L=0,R=10)")
title(main="Linear Regression of Vote Share vs Mean Placement on Ideological Scale")
legend("bottomright",legend=c("Labour Party 2017","Labour Party 2019","Labour Party 2020","Conservative Party 2017","Conservative Party 2019","Conservative Party 2020","Green Party 2017","Green Party 2019","Green Party 2020","LibDem Party 2017","LibDem Party 2019","Lib-Dem Party 2020"),col=c("firebrick1","firebrick","firebrick4","dodgerblue","dodgerblue2","dodger-blue4","chartreuse","chartreuse3","chartreuse4","goldenrod","goldenrod2","goldenrod4"),pch=16)
points(LabourVotes$MeanIDScore[1],LabourVotes$Vote.Share[1],col="firebrick1",pch=16)
points(LabourVotes$MeanIDScore[2],LabourVotes$Vote.Share[2],col="firebrick",pch=16)
points(LabourVotes$MeanIDScore[3],LabourVotes$Vote.Share[3],col="firebrick4",pch=16)
points(ConservativeVotes$MeanIDScore[1],ConservativeVotes$Vote.Share[1],col="dodger-blue",pch=16)
points(ConservativeVotes$MeanIDScore[2],ConservativeVotes$Vote.Share[2],col="dodger-blue2",pch=16)
points(ConservativeVotes$MeanIDScore[3],ConservativeVotes$Vote.Share[3],col="dodger-blue4",pch=16)
points(GreenVotes$MeanIDScore[1],GreenVotes$Vote.Share[1],col="chartreuse",pch=16)
points(GreenVotes$MeanIDScore[2],GreenVotes$Vote.Share[2],col="chartreuse3",pch=16)
points(GreenVotes$MeanIDScore[3],GreenVotes$Vote.Share[3],col="chartreuse4",pch=16)
points(LibDemVotes$MeanIDScore[1],LibDemVotes$Vote.Share[1],col="goldenrod",pch=16)
points(LibDemVotes$MeanIDScore[2],LibDemVotes$Vote.Share[2],col="goldenrod2",pch=16)
points(LibDemVotes$MeanIDScore[3],LibDemVotes$Vote.Share[3],col="goldenrod4",pch=16)
abline(OverallmodelVoteShare)
```

#Now we have our models we want to check their power, and residual distributions
#Get Power level, R Squared and effect size (Hedge's G - Cohen's d for small sample sizes)

```
nstall.packages("effsize")
library(effsize)
cohen.d(d=ElectoralScore$Vote.Share,f=ElectoralScore$MeanIDScore,hedges.correction=TRUE,-data=ElectoralScore)

Hedges  g

g estimate: 1.376177 (large)
95 percent confidence interval:
   lower     upper
0.4670922 2.2852624
------------
cohen.d(d=ElectoralScore$Seats,f=ElectoralScore$MeanIDScore,hedges.correction=TRUE,data-=ElectoralScore)

Hedges g
```

```
g estimate: 1.251721 (large)
95 percent confidence interval:
    lower     upper
0.3577877 2.1456541
---------
  cohen.d(d=LabourVotes$Vote.Share,f=LabourVotes$MeanIDScore,hedges.correction=TRUE,da-
ta=ElectoralScore)

Hedges g

g estimate: 9.8328 (large)
95 percent confidence interval:
    lower     upper
 3.272427 16.393173
----------
  cohen.d(d=LabourVotes$Seats,f=LabourVotes$MeanIDScore,hedges.correction=TRUE,data=Elec-
toralScore)

 Hedges g

g estimate: 8.020754 (large)
95 percent confidence interval:
    lower     upper
 2.567507 13.474001
----
  cohen.d(d=ConservativeVotes$Vote.Share,f=ConservativeVotes$MeanIDScore,hedges.correc-
tion=TRUE,data=ElectoralScore)

 Hedges g

g estimate: 20.57553 (large)
95 percent confidence interval:
    lower     upper
 7.258586 33.892477
-----
  cohen.d(d=ConservativeVotes$Seats,f=ConservativeVotes$MeanIDScore,hedges.correc-
tion=TRUE,data=ElectoralScore)

 Hedges g

g estimate: 15.45352 (large)
95 percent confidence interval:
    lower     upper
 5.380238 25.526799
------
  cohen.d(d=GreenVotes$Vote.Share,f=GreenVotes$MeanIDScore,hedges.correction=TRUE,data-
=ElectoralScore)

 Hedges g

g estimate: -0.05316131 (negligible)
95 percent confidence interval:
    lower     upper
-1.867048  1.760725
------
  cohen.d(d=GreenVotes$Seats,f=GreenVotes$MeanIDScore,hedges.correction=TRUE,data=Elec-
toralScore)

Hedges g

g estimate: -19.63892 (large)
95 percent confidence interval:
     lower      upper
-32.361181  -6.916667
---------------
cohen.d(d=LibDemVotes$Vote.Share,f=LibDemVotes$MeanIDScore,hedges.correction=TRUE,da-
ta=ElectoralScore)

Hedges g

g estimate: 1.670081 (large)
95 percent confidence interval:
     lower      upper
-0.4360359  3.7761980
--------
cohen.d(d=LibDemVotes$Seats,f=LibDemVotes$MeanIDScore,hedges.correction=TRUE,data-
=ElectoralScore)

Hedges g

g estimate: 1.277782 (large)
95 percent confidence interval:
     lower      upper
-0.7122641  3.2678274
-------------
```

 # Power analysis

```
OverallVoteSharepwr<-pwr.f2.test(u=1,v=10,f2=1.376177,sig.level=0.05)
OverallVoteSharepwr$power
[1] 0.9545093
OverallSeatspwr<-pwr.f2.test(u=1,v=10,f2= 1.251721,sig.level=0.05)
 OverallSeatspwr$power
[1] 0.9361521
```

#Example of subset

```
 LabourVoteSharepwr<-pwr.f2.test(u=1,v=1,f2=9.8328 ,sig.level=0.05)
 LabourVoteSharepwr$power
 [1] 0.3299872
 LabourSeatspwr<-pwr.f2.test(u=1,v=1,f2=8.020754 ,sig.level=0.05)
 LabourSeatspwr$power
 [1] 0.2996646
```

#Subsets clearly underpowered
#Plot residuals for both overall models

```
plot(OverallmodelVoteShare$residuals)
title(main="Residuals for Linear Model Vote Share~Mean Ideological Position")
```

abline(h=0)