

Values, World Society
and Modelling
Yearbook 2015

Values, World Society and Modelling Yearbook 2015

By

Gordon Burt

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ACKNOWLEDGEMENTS

When I joined the Conflict Research Society in 1982, there were two key figures. I never met John Burton but everybody talked about him. Values were at the heart of John Burton's approach to conflict resolution. 'World Society'¹ was the title of one of his books. Michael Nicholson I did meet – and continued to meet over the next couple of decades. 'Formal Theories in International Relations'² was the title of one of Michael's books – 'formal theories', in other words modelling. So there you have it: values, world society and modelling.

The year 2015 was the centenary of John Burton's birth. To mark the centenary, the theme for the Conflict Research Society (CRS) annual conference was: *Peace and Violence Explained? Assessing John Burton's Legacy*. A highlight of the conference was *The John Burton Memorial Lecture 2015*, delivered by Kevin Clements, and this is reproduced below in Chapter 2.

The Yearbook is considerably strengthened by this and a number of other guest contributions by those who were present at the conference or associated with the CRS: *Peace Researchers Urge Caution over the Bombing in Syria* by Kevin Clements, Feargal Cochrane and Hugh Miall; *Europe — do the right thing by the refugees and what is practical also* by Dennis Sandole; *Bring Russia out of the cold and into the fold* by Dennis Sandole; and *The Greek bailout referendum* by Rania Dimitraki.

Thank you to all my guest contributors for kindly allowing me to reproduce their work in this Yearbook. Thank you also to my many friends in the CRS who have over the years encouraged and supported me in taking my work in this direction.

I had been wondering what to say about the family. Now I know. Last week was mid-term. The house was alive with the sound of grandchildren. A week on we are still surrounded by toys and equipment waiting for me to put them away. Thanks, Catherine, for your forbearance and everything.

Finally the UN and I were born in the same year. I rather like it that in our seventieth year I am able to thank the UN for permission to put on the cover of this book their map, "The World in 1945."

¹ Burton, John W. *World Society*. London: Macmillan, 1972.

² Nicholson, Michael. *Formal Theories in International Relations*. Cambridge: Cambridge University Press, 1989.

CHAPTER ONE

INTRODUCTION AND OVERVIEW

The year 2015 was the seventieth anniversary of the establishment of the United Nations, the dropping of the atom bomb on Hiroshima and Nagasaki, the end of the Second World War, and the start of the ‘Long Peace’. The year saw the continuation of social progress overall – but at the same time the suffering of many individuals and groups. Economic tensions and the policy of austerity were at the centre of the three votes in Greece (the election in January, the referendum in July and the second election in September). Cultural tensions were displayed: between Islam and secularism in the Paris attacks (on Charlie Hebdo cartoonists in January - and then again in November); between Christian south and Muslim north in the Nigerian elections (in March); between religion and secularism in Ireland’s referendum on same-sex marriage (in May); and in debates about the Enlightenment surrounding the bicentenary of the Battle of Waterloo. Demographics, austerity, migration and nationalism were all issues in the UK general election (in May). The results displayed a flight from the centre, which was evident too in the election of Jeremy Corbyn as leader of the Labour Party. An earlier history, the collapse of the Ottoman Empire in the First World War, was reflected in contemporary conflict in Syria and Libya and elsewhere, with debates about intervention and debates about the consequent refugees arriving in Europe. The year also saw a continuation of some of the issues discussed in the 2014 Yearbook: Ukraine, Scottish nationalism, the decline of centre parties and the emergence of non-centrist leaders in Europe and concern about threats to ‘our values’. Turning to the natural world, a total eclipse of the sun occurred on 20 March 2015 in the Faroe Islands.

The 2015 Yearbook discusses these events alongside a variety of other specific events and general issues. This is the second Yearbook. Like its predecessor, the 2015 Yearbook does not aim to be a comprehensive or representative account of the year's events – it is merely a personal selection, written from the UK, and informed by the UK press, mainly *The Times* - but with aspirations to reach beyond that particular location. It draws on the monthly issues of the *Commentary* which were produced

during the year under the banner of *A New Agenda*.¹ *A New Agenda* seeks to explore all aspects of society using all the academic disciplines paying special attention to values ... with special interest in modelling ... not disinterested in practice ... and aspiring to high academic standards. The rationale for the New Agenda is discussed in more detail in the 2014 Yearbook.²

A special feature of the present Yearbook is that the modelling aspect is strongly structured around the notions of space, time and value. Six of the chapters have space in their title – physical space, geographical space, psychological space, social space, political space and value space. Four of the chapters have time in their title. Whereas Part I discusses values in a qualitative way, later in the book models of values are developed for particular topics and then Chapter 14 provides a systematic account of value spaces.

The Yearbook is considerably strengthened by a number of guest contributions: *The John Burton Memorial Lecture 2015*, by Kevin Clements; *Peace Researchers Urge Caution over the Bombing in Syria* by Kevin Clements, Feargal Cochrane and Hugh Miall; *Europe — do the right thing by the refugees and what is practical also* by Dennis Sandole; *Bring Russia out of the cold and into the fold* by Dennis Sandole; and *The Greek bailout referendum* by Rania Dimitraki.

John Burton, 1915-2010

The year 2015 was the centenary of the birth of one of those who attended the UN San Francisco conference in 1945, namely John Burton, founder of the Conflict Research Society. To mark the centenary, the Conflict Research Society's annual conference had the following theme: 'Peace and Violence Explained? Assessing John Burton's Legacy'. A highlight of the conference was *The John Burton Memorial Lecture 2015*, delivered by Kevin Clements, and this is reproduced below in Chapter 2.

In 1965 John Burton had been a central figure in organising a CIBA Foundation Symposium on *Conflict in Society*. Those participating included: Barbu, Boulding, Burton, Chance, Cohn, Deutsch, DeVos, Dicks, Emery, Galtung, Glass, Haddow, Lapter, Lasswell, Marcuse, Nicholson, Rapoport, Röling, Sondhi, Tomkins, Trist, van Doorn and

¹ Burt, Gordon. "A New Agenda." Accessed 1 June 2015.

<https://sites.google.com/site/gordonburmathsocsci/home/a-new-agenda>.

² Burt, Gordon. *Values, World Society and Modelling Yearbook, 2014*. Newcastle: Cambridge Scholars, 2016, xii, 1-3.

Washburn. Anthony de Reuck and Julie Knight edited a collection of the contributions. De Reuck's Preface is interesting, not least for its indication of the broad scope of the project:

“About three years ago there began to emerge in this country a new discipline, or more properly, perhaps, a multi-disciplinary field of inquiry into the causes and control of conflict in human society. The subject had already been recognized for some time in the United States where a Centre for Research on Conflict Resolution had been created at the University of Michigan in 1959, and also in continental Europe where, for example, a Peace Research Institute exists within the Institute for Social Research in Oslo. The Centre in Michigan publishes the *Journal of Conflict Resolution* and the Institute in Oslo produces the *Journal of Peace Research* as vehicles for research papers in this field.

Formal recognition of this new area of discourse in Britain occurred in June 1963 when a meeting was convened at Windsor which resulted in the formation of the Conflict Research Society. The present symposium arose out of the ensuing discussions from a suggestion by Dr. Jack Mongar, of University College, London, that such a meeting might be held to mark the new status of the subject. In the meantime a senior research fellowship in conflict studies had been established in the University of Lancaster, and happily Dr Michael Nicholson, the present incumbent, was able to attend this symposium ...

... The programme does not reflect any firm theoretical view of the proper limits of the field or of the nature of conflict ...

... The intention of this symposium is to discuss conflict between social groups at a hierarchy of levels, ranging from situations involving small groups of people face to face, and proceeding through confrontations of large and apparently relatively impersonal institutions such as occur, for example, in industrial disputes between management and trade unions, right up to international conflict and nations at war ...

... The symposium is essentially inter-disciplinary, involving sociology, anthropology, social psychology, psychiatry, ethnology, systems analysis, political science, history and international relations ...”³

I would like to think that the Yearbook is a descendant of that earlier interdisciplinarity fifty years ago.

³ De Reuck, Anthony V. S. and Julie Knight. (Eds.) *Conflict in Society*. CIBA Foundation Symposium. London: CIBA Foundation/ J. & A. Churchill, 1966.

Overview of the chapters

Part I Values

2 Transcending adversarialism:

The John Burton Memorial Lecture 2015, by Kevin Clements

“Transcending adversarialism to satisfy Basic Human Needs: John Burton’s relevance for 21st century conflict transformation?” John Burton was a very complex diplomat, scholar and practitioner. In the first role he made many important contributions to the formation of an independent foreign policy for Australia and in the second he was one of the founding fathers of peace and conflict studies. Chapter 2 aims at evaluating his theoretical and practice contributions to conflict resolution and peace studies.

Burton’s experience as a key player in Australian government gave him a deep awareness of power and decision-making in complex situations – and a deep scepticism. As an academic he challenged the dominance of the state-based power politics paradigm and argued for attention to Basic Human Needs and world society. As a scholar-practitioner, Burton’s Problem Solving Workshops aimed to create an environment where individuals changed their perception of others, recognised the presence of frustrated human needs, thought about positive relationships and generated options for transforming relationships. Before and since, there have been many other individuals and organisations engaged in somewhat similar processes. Kelman’s work is of particular interest. How useful are these approaches? The workshops are important at the micro level but the entry problem and the transfer problem remain important challenges.

Turning to the challenges of the 21st Century, it is noted that there were over 100,000 battle-related deaths last year (2014), just a tip of the vast iceberg of human misery with 60 million people being displaced. While the Basic Human Needs of these millions are not being met, it is hard to see how problem-solving workshops and other well-intentioned interventions can make much of a dent in these figures. We need to rediscover our common humanity; provide immediate assistance; raise consciousness about responsibility; accept responsibility; and together devise global solutions. Even though non-adversarial politics are a stretch from interactive problem solving, there is no doubt that this was Burton’s final vision and moving in this direction would ensure that the Burtonian legacy continues as we devise practical processes for 21st century challenges.

3 Life as a journey

A life is the journey of an individual in the history of society. What happens is affected by randomness and by coincidence – as the tenth anniversary of the London bombings reminds us. Life involves interactions and relationships with others; and life engages with the structure of society. Life is characterised by values. Of central importance is ‘feeling at home in the world’ – exemplified by Ted Short’s love of the Lake District. Life involves ‘the speculative pursuit of value’ and what is experienced is a journey of fluctuating fortunes.

The Gideon Bible offers advice on life’s various ups and downs. Robert Louis Stevenson’s *El Dorado*, a popular Jack Berch song of the 1950s, and Constantine Cavafy’s *Ithaca* – all agree that life should be embraced positively. In relationships, Pinker, Burton, Mitchell and Richardson advocate empathy, harmony and love - and the reciprocation of these. Social institutions such as family, friends, schools and religious communities can provide support and advice, care and therapy and ‘the nurturing of flourishing’. The cases of Sidwell School and Eton are considered, as are the writings of Jonathan Sacks.

Society is characterised by division and by stratification and its attendant inequality. A life has a location in this structure and life is characterised by movement within the structure - sometimes the upward social mobility of Andy Burnham, Michelle Obama and Sathnam Sanghera. But lives may be lived in separate ‘cities’ - Ronald Reagan’s ‘shining city on a hill’ and Mario Cuomo’s city of those who are excluded.

4 ‘Our values’: the Enlightenment ... the Prophet

Chapter 4 considers values at the group or societal level. How do ‘we’ see ‘our’ values? Are our values unanimous? universal? exceptional? good? safe? The focus is on the values of the Enlightenment. There has been recent debate between optimistic advocates of the Enlightenment such as Grayling and Pinker and pessimistic sceptics such as Gray and Taleb. The history of the Enlightenment takes us back to the period of the French revolution and the American Revolution and Napoleon’s campaigns of the 19th century ... and the poetry of Scotland’s national poet Robert Burns. His poem ‘Is there for honest poverty?’ has been referred to as ‘the Marseillaise of humanity’. The Battle of Waterloo in 1815 might be seen as a postscript to the French Revolution (and a prelude to the First World War and the final collapse of the Austrian, Russian and Ottoman empires) – and two hundred years later still prompts debate about values. Are the

values of the French Revolution - Liberté, Égalité, Fraternité (and Laïcité) – compatible with one another?

On 7th January 2015 the debate between the Enlightenment and religion took on a tragic form: the Charlie Hebdo cartoonists valued their Enlightenment freedom of expression to satirise Muhammad and the Paris killers loved Muhammad and took revenge on the insult to his honour. The reactions can be classified as for or against the cartoonists, and for or against the killings - and within these broad categories there is a great diversity of specific reactions. There was discussion of freedom of speech and the right to offend; the threat to Jews and Christians; Muslim moderation and Islamic fundamentalism; extremism on both sides and their interaction; security and the restriction of intolerance; the French Empire and the marginalisation of Muslims; and Western intervention and the casualties of conflicts elsewhere.

Part II World Society

This second part of the book looks at world society. Chapter 5 provides an account of some of the events and issues that appeared in the news headlines in 2015. The remaining chapters all consider representations of world society using the basic concepts of space and time. Chapter 6 considers social space and psychological space and international and regional variation in these two spaces. Whereas Chapter 5 follows the news headlines, Chapter 6 considers systematic data sets for a variety of social indicators and Chapter 7 looks at world historical trends in relation to social value, population and violence. Chapters 8 and 9 consider political space and geographical space. In three cases – elections in Nigeria, Greece and Ireland - the vote is between two options and hence the percentages can be represented in one-dimensional political space. The fourth case is the Northern Ireland election. Here, because there are many parties the percentages are represented in multi-dimensional political space. Chapters 10 to 12 all deal with politics in the UK. Chapter 10 discusses the prelude to the 2015 general election, noting the fluctuating party fortunes in the 2010-2015 period; and also provides an analysis of the results. Chapter 11 notes that dissatisfaction has been expressed with various aspects of democracy over the past year and considers the extent to which democracy can deliver satisfaction or dissatisfaction. In doing so it makes use of the concept of value space. Chapter 12 returns to the study of time, here in relation to elections in the UK over the past seventy years, drawing on the concepts of volatility, time series models and complexity.

5 World society in 2015

The chapter starts with a consideration of John Burton's concept of 'world society' – thus continuing the discussion in Chapters 1 and 2 of John Burton's work. We then identify some of the main news headlines in 2015 and provide discussion of a few of the main stories.

There have been tensions in a number of spheres. In the economic sphere, despite world growth overall, world society is characterised by division and by stratification and by the attendant inequality in people's lives (as discussed in Chapter 3). In particular the crisis of 2008 has led to austerity measures and these have been met with resistance, no more so than in Greece. A commentary on the situation is given by Ourania Dimitraki and this is followed up in Chapter 8 with an analysis of the Greek bailout referendum.

In the cultural sphere, there have been tensions between different religions and between religion and modernity. Chapter 4 has already discussed the tensions between the Enlightenment and religion in relation to the Paris bombings. In this chapter we discuss the situation in Nigeria and this is followed up in Chapter 8 with an analysis of the Nigerian presidential election results. There have also been tensions concerning attitudes to sexual relations, one illustration being Ireland's referendum on same-sex marriage (also to be discussed further in Chapter 8).

Geopolitical and military tensions have accompanied these economic and cultural tensions and there has been an increase in migration, with many refugees. Debates about migration to the West were accompanied by debates about intervention by the West. Western concern in 2015 about Arab fundamentalism had been preceded by Western excitement in 2011 about the Arab Spring and the overthrow of the Arab dictator Gaddafi ... there were recollections also of Saddam Hussein in 2003 ... and Nasser in 1956. In December 2015 peace researchers urged caution as the UK House of Commons prepared to vote for air strikes on Isis in Syria.

A hundred years earlier also saw British military involvement in the Arab world. The intervening hundred years have seen the rise and fall of empires. Seventy years ago, towards the end of 1945 the world was in an unprecedented situation. The armies of just three countries – USA, UK and Soviet Union - were present in and supervising the political governing of 'most of the world'. That same year the United Nations was established with these three countries forming the UN Security Council (alongside France and China). In November 2015 the UN Security Council called on countries to take all necessary measures to wipe out Isis.

6 Social and psychological space - geographical variation

This chapter looks at the relationships between a variety of social and psychological variables and, on this basis, places the variables in an abstract space. Variation between nations and between regions is studied rather than variation between individuals. The focus is on per capita variables not aggregate variables. This chapter is the first of several in which the abstract concept of space plays a central role.

The chapter has two parts. The first part is on social value. How do countries differ? How do different dimensions of social value relate to one another? Does more money lead to more social value? World maps of social progress for 133 countries are given in the 2015 Report for the Social Progress Index (SPI). The overall SPI correlates +0.8 with GDP per capita. It correlates +0.8 with life satisfaction and -0.8 with extreme poverty – but it has only a weak negative correlation, -0.4, with inequality. An analysis of the twelve main variables in the SPI identifies a first principal component which explains almost 50% of the total variance, running from basic features of progress to more advanced features. The correlations between variables suggest ‘divergent sequential development’. A separate study considers the relationship between GDP per capita and democracy: does more money lead to more democracy? - or is there a U-shaped relationship?

The second part of this chapter is on psychology and geography and a range of important social variables. How do regions within the UK differ? How do the different variables relate to one another? ‘Friendly Scots and grumpy Londoners’ was typical of the superficial newspaper headlines, belying the depth of the actual study of 380 Local Authority Districts in the UK by Rentfrow and his colleagues. The pattern of results was similar to findings from previous research: personality traits are unevenly distributed geographically and this is associated with a range of important social outcomes. Personality was assessed using the Big Five Inventory. An analysis of the correlations at the individual and group level locates the Big Five along a continuum: from Agreeableness to Conscientiousness to Stability to Extraversion to Openness. The correlations for each of the Five have a single-peaked profile on the continuum. Likewise, the correlations for each of twenty-four political, economic, social, health and demographic variables have a single-peaked or single-troughed profile on the continuum.

7 Time series: social value, violence and population

This is the first of two chapters about how things change over time. Here we discuss social value, violence and population. In a later chapter, we discuss the history of party fortunes in UK general elections.

Whereas the previous chapter looked at how social value varied between nations, the present chapter considers how social value changes over time. Has social value increased? Whereas the measure of social value used in the previous chapter was the Social Progress Index (SPI), the measure of social value used in this chapter is the United Nations Human Development Index (HDI). The previous chapter noted a correlation between social value and GDP per capita. Given that world GDP per capita has increased, social value should also have increased. This is what we find: the HDI shows a linear increase in the period 1980-2013. Turning to a specific aspect of social value in a specific country, life expectancy in England has had a linear increase over the period 1991-2014. There is some inequality between regions which has reduced slightly over the period. At least in these studies then, social value has increased.

Whereas the word ‘violence’ is normally used to refer to physical harm, the phrase ‘structural violence’ is sometimes used to refer to a broader lack of social value. So measures such as the HDI might be taken as measures of the lack of structural violence, with increases in HDI representing decreases in structural violence. So, according to the above studies, structural violence has decreased.

Measures of social value can be aggregate totals or per capita averages and this prompts us to look at population trends. The simplest model of population dynamics is an exponential one with a constant growth rate. Applying this model to De Long’s data, we find that growth rates increase: low in the early period up to 5000BC; and 0.0007 in the period 5000BC-1500AD, 0.004 in the period 1500AD to 1940 and 0.02 in the period 1945 to 2000.

One specific aspect of social value is peace - or its opposite, violence. In 2013 the journal *Sociology* published a Book Review Symposium on Steven Pinker’s *The Better Angels of Our Nature*, and this was also discussed by Scott Gates and Larry Ray at the 2015 annual conference of the Conflict Research Society. This prompts a re-examination of Steven Pinker’s Chapter 5, ‘The Long Peace’, and its thesis of declining violence. The underlying equations are formulated. Attention then focuses on the war death rate and its probability distribution. A beta distribution gives a fair approximation to the data. Finally models for the time series of the war death rates are considered.

8 Nigeria, Greece and Ireland: geography and one-dimensional political space

This chapter is about the relationship between political space and geographical space. The political space considered here is only one-dimensional because it is based on the percentage vote in cases where there are just two options. Three cases are considered: the presidential election in Nigeria; the bailout referendum in Greece; and the same-sex referendum in Ireland. The background to these three cases is given in Chapter 5.

The first case is Nigeria. Presidential elections were held in Nigeria in March 2015. Muhammadu Buhari gained 54% of the votes and the sitting president, Goodluck Johnson, gained 45% - a sizeable win for Buhari but still substantial support for Johnson. Of the total variation in voting, 59% was within-state variation and 41% was between-state variation. Across the 37 states, the vote for Buhari ranged between 1% and 95%.

Political space relates to geographical space. This can be studied in various ways. Looking at the 50% 'winning contour partition', Buhari won in a single set of connected states and Johnson won in three connected sets of states: the mid-south, the east-middle and the Federal capital. Contour-partitions at different levels divided the country into four: north, upper middle, lower middle, and mid-south, ordered according to decreasing Buhari vote. Latitude north correlates 0.9 with the Buhari vote. The voting surface can be represented by a series of west-east sections for different latitudes north and this suggests an interaction between latitude north and longitude east and also a special mid-south effect. The pattern of results is also illustrated by looking at the spatial network of states and the correlated profiles for the primary and secondary concentric perimeters.

The second case is Greece. Three elections were held in Greece in 2015: a legislative election on 25 January and a second legislative election on 20 September - but it is the bailout referendum, held on 5 July between these two other elections, that we focus on here. In terms of differences between states the two legislative election results correlated 0.9 with one another and each correlated 0.7 with the referendum results. The bailout proposal was rejected with 61% voting 'No' and 39% voting 'Yes' - a sizeable win for 'No'. Voting percentages across the 57 regions ranged between 51% and 74% - revealing a moderately divided society. Political space relates to geographical space. Perimeter profiles exhibited local jaggedness superposed on single-peakedness.

The third case is Ireland. On 22 May 2015 a referendum was held in Ireland to mandate provision for same-sex marriage. The bill was

supported by all political parties but officially opposed by the Roman Catholic Church, in Ireland and in the Vatican (85% of the population in Ireland is Catholic). The 62% 'Yes' vote was, as well as being a sizeable win, also reflective of a divided society. Voting across the 43 constituencies exhibited a uniform distribution with the 'Yes' vote ranging from 75% (Dublin South East) to 49% (Roscommon Leitrim). So variation within constituencies was much greater than variation between constituencies. Political space relates to demographics: the 'Yes' vote correlated 0.9 with the logarithm of population density, with the area of the constituency and with the 'internal distance'. Political space relates to geographical space, in particular to an urban-rural divide. The highest 'Yes' vote was in the capital, Dublin, in the East; next were 'medium urban' areas, the east & south coastal corridor and the two urban areas in the west, Limerick and Galway; and finally, lowest were rural and lesser urban areas, the north being lower than the south. An equation seeks to capture east-west and south-north gradients as well as urban peaks. Ireland has a lower urban population (63%) than the UK (83%) and just nine urban areas with more than 30,000 people (following a power distribution). These areas and their internal transport linkages are mostly situated on the east & south coastal corridor, and are the primary terminals for transport to the UK and the rest of Europe. Turnout was positively related to the 'Yes' vote; and (hence?) to demographics.

The chapter ends with a comparison of seven binary-option elections: USA 2008 and 2012; Ukraine 2014; Scotland 2014; Nigeria 2015; Greece 2015; and Ireland 2015.

9 Northern Ireland: multidimensional political space and geography

This chapter, like the previous one, is about the relationship between political space and geographical space. Unlike the previous chapter, the political space considered here is multi-dimensional because it is based on the percentage votes in a case where there are many options. Also, in this chapter it is the political space that receives most attention with only a brief consideration of the geographical aspect.

The chapter is about the Northern Ireland election of 2015 (held as part of the UK general election which is discussed in the following Chapters 10 to 12). Voters can choose between many parties. So the voting percentages can be represented by a point in multidimensional political space. The overall result is a point in political space; each constituency result is a point in political space; and the set of constituency results can be

represented as a set of points in political space. The space is a percentage space and so is finite with a well-defined centre. What is the shape of the set of points in relation to the centre?

There are a few large parties and many small parties and so the ‘overall point’ is quite far from the centre of the space. Moreover, many of the individual constituency results show dominance by a single party – and so the constituency points are quite far from the overall point. Different parties have dominance in different constituencies (‘multidimensional polarisation’) and so the constituency points are quite far from one another - in different directions from the overall point.

Larger parties vary more across constituencies than smaller parties do, and this is reflected in differential variation in different dimensions. The first component in a principal component analysis concerns the competition between the two largest parties: Sinn Fein against the Democratic Unionists. It explains 30% of the total variance. The thirteen parties can be ordered along this primary continuum with Sinn Fein at one extreme and the Democratic Unionists (and the smaller Alliance and Conservative parties) at the other. The eighteen constituencies can also be ordered along this primary continuum with Belfast and Newry & Armagh (where Sinn Fein is strong) at one extreme and Belfast East and North Down (where Democratic Unionists, Alliance and Conservatives are strong) at the other. Restricting attention to the subspace containing the five largest parties, another analysis finds the same first component as before, and a second component being Ulster Unionists versus the Social Democratic and Labour Party.

On a one-dimensional continuum, parties tend to peak to the left or to the right. In a two-dimensional space, constituencies are located on a closed loop and parties peak at the point on the loop nearest the party vertex, giving an approximately sinusoidal curve.

Political space relates to geographical space. There is a gradient of increasing X score (DUP strong) running from South-West to North-East – with contours of equal X-score at right angles to the gradient. The borders reflect the gradient, the North-East looking to Scotland and the UK and the South-West adjoining Ireland – Ulster Unionists look to the UK and Sinn Fein looks to Ireland.

10 The UK general election, 2015: prelude and outcome

The UK general election of 2010 had replaced Gordon Brown’s Labour government with a coalition between David Cameron’s Conservatives and Nick Clegg’s Liberal Democrats. The subsequent party fortunes in the

period between the 2010 and 2015 can be gauged from a number of sources. Opinion polls had tracked the almost immediate collapse of Liberal Democrat support and the steady rise in UKIP support. In Scotland, Scottish Nationalists overtook Labour, briefly in 2011 and again, massively, in 2015. Less dramatically, in the UK overall, Conservative support had fallen and Labour support had risen but the gap closed as the 2015 election approached. The results of by-elections, local government elections and European elections were broadly consistent with the patterns indicated by the polls. Migration of support on the left-right continuum was characterised by a flight from the centre.

Widespread dissatisfaction and disagreement characterised the debate in the run-up to the election. On election morning the poll of polls indicated a hung parliament. The day before, the press on the right, left and centre had warned the electorate of the consequences of making the wrong choice. Over the preceding month *The Times* had headlined: ‘panic in the markets’, Farage and Sturgeon winning the seven-way leaders’ debate, Clegg opening the door to a Miliband government backed by SNP, Cameron inching ahead, and the Queen to take control of the election aftermath.

... Then the dramatic change in just 24 hours: the belief on election morning that this was going to be ‘the closest vote for decades’; and at 10pm the same day the Exit poll put the Conservatives well ahead. It was the ‘sweetest victory’ for the Conservatives and in the north ‘the Scottish lion [had] roared’. In the aftermath the performance of the opinion polls was appraised.

... The chapter studies the distribution of shares of the vote, overall and by nation; and power and representation are considered.

11 Democracy: satisfaction? ... dissatisfaction? ... value space

Does democracy deliver satisfaction? - or dissatisfaction? Over the past year, dissatisfaction has been expressed with various aspects of democracy. Democratic elections raise hopes of satisfaction which cannot be fulfilled for all. The elections we have studied in previous chapters have given the satisfaction of victory sometimes to a majority and sometimes to just a minority - but always leaving at least a sizeable minority experiencing the dissatisfaction of defeat. Moreover the following Chapter 12 will show that the percentage experiencing the satisfaction of victory in UK elections has declined over the past seventy years.

The concept of a value space can provide useful insight into these issues. Using it, Chapter 14 will show that there are theoretical limits to the amount of satisfaction which democracy can deliver. In this chapter we look at two studies which are particularly informative. The first study asks about the amount of value of each option; it asks about many options; and the analysis applies multiple criteria in its evaluation of the options. The second study asks for a full preference ordering of the options.

With the prospect (at the time) of a coalition government a survey asked people to place a value on each of nine possible government outcomes. All nine options had a mean negative rating, with a Conservative majority government being the least negative. However this option scored poorly on polarisation and extreme dissatisfaction. People's views were approximately consistent with single-peaked value functions on a left-right continuum in value space.

After the election, dissatisfaction within society gave way to dissatisfaction within parties. In particular there was a discourse of dissatisfaction in the Labour Party and in the media relating to the candidacy and leadership of Jeremy Corbyn. A survey found a diversity of views amongst Labour Party members. The preference orderings can be represented by the vertices of a tetradecahedron. Most preference orderings were close to a transversal corresponding to single-peaked value functions on a left-right continuum in value space.

Finally it should be noted that the same broad argument applies not just to democracy but to any system of government, and not just to systems of government but to all social arrangements.

12 Time series: UK general elections, 1945 to 2015

This is the second chapter about time. The first chapter on time discussed time series for international measures of social value, violence and population. Here we discuss UK general elections. The first part of the chapter is about change from one point in time to the next: from 2010 to 2015. The second part of the chapter is about time series: from 1945 to 2015.

Volatility measures are used to check the claim that the result of the 2015 general election was a political 'earthquake'. Some things stayed the same and some things changed. Some things changed just a little and some things changed a lot. The flight from the centre is noted – in terms of both aggregate and individual vote. Detailed results for votes and for seats for the four nations are noted and related to party contributions to volatility.

Looking at the seventy post-war years, 1945 to 2015, there have been nineteen governments and elections. Governing parties age: they are likely to win a second election but increasingly unlikely to win later elections.

The trends in UK general elections over the period 1945 to 2015 exhibit: the post-war decline of two-party politics; the post-war decline of three-party politics; the rise of ‘Other’ parties; and the decline in electoral support for incoming governments. The time series for party support are modelled by first-order auto-regressive models and equilibrium values are noted. The time series for Liberal Democrats suggests a model with two equilibria. The trajectories are studied by plotting change in vote against vote. Party trajectories are related: percentages sum to 100%; and the correlation matrix exhibits certain patterns. The notion of a hierarchy of competition between the parties is noted and the corresponding trajectories investigated.

Part III Modelling

13 Sets and functions; time and space

The preceding chapters have discussed a variety of topics and in many cases drawn on mathematics to provide models of the topics. In this chapter and the following one we bring all these applications together and also deepen and extend the mathematical treatment. The first part of the present chapter reviews the basic mathematics - the sets, functions and distributions - that have been used in the book. Linear, logarithmic, exponential, power and sinusoidal functions; arithmetic and geometric series; and probability, cumulative, geometric and beta distributions are all considered. There are specific links to Chapters 7, 8 and 10.

The second part of the chapter considers the basic concepts of time and space. Linear and exponential functions, difference and differential equations, autoregression, flow and complexity provide models of change over time – with application to Chapters 7 and 12. The notion of a space-time varying probability distribution is discussed – relating to the war death rate model in Chapter 7. Attention then turns to spaces: abstract space, geographical space and factor spaces such as those for social and psychological variables. The geometry of objects in abstract space is noted – relating to Chapters 9 and 11 – but this will be discussed in detail in the next chapter. Different approaches to modelling variation over geographical space are discussed including the use of spatial correlations – relating to Chapters 8 and 9. The analysis of multidimensional space is

then discussed with special attention to a geometric representation of the correlation matrix – relating to Chapters 6 and 9.

14 Value spaces; the Earth in space and time

The present chapter is the second on modelling and continues the work of Chapter 13. The chapter is in two parts. The first part continues the discussion of space in Chapter 13, now addressing the topic of value spaces. The second part considers the concept of space and time in relation to the Earth and two of the news stories which appeared in 2015.

We consider value spaces in three different contexts: amount of value, preference and voting percentage. In each case there is a set of individuals and a set of objects.

The first context is where each individual places a value (an amount of value) on each object. For example in one of the studies discussed in Chapter 11 each individual places a value on each possible coalition government. A possible model for this situation is that objects are located in an object space and that people have different ideal points in object space and different single-peaked value functions on object space. Both the inverted modulus function and the quadratic function are discussed. The latter gives the result that the social welfare of a situation depends on the population sensitivity, the population-weighted variation, the deviation of the situation from the welfare ideal and the welfare ceiling.

The second context is where each individual puts an order of preference on the set of objects. For example in one of the studies discussed in Chapter 11 each individual puts an order of preference on the candidates for the Labour party leadership. The set of orderings of four objects forms a tetradecahedron in which single-peaked transversals can be identified.

The third context is where each individual identifies only their first preference amongst a set of objects. This enables an aggregate social value, the percentage of first preferences, to be placed on each object – as in the various elections studied in Chapters 8 to 12. The overall result is a point in percentage space and the set of constituency results gives a set of points. The case where the set of points lie on a circle inscribed in a tetrahedron are discussed.

There is a relationship between value space, preference space and percentage space: preference orderings correspond to regions of value space; and percentage space is a finite polytope contained in value space. For example the preference hexagon can be inscribed in the percentage